Holding the press to get you the latest Washington news paid us handsome dividends for this issue. The report by Roland C. Davies, our Washington columnist, gives you complete news coverage on several developments of much importance to the Independent telephone industry.

▼ ▼

The officers of the United States Independent Telephone Association are having busy times these days. President Agee is attending hearings in Washington, visiting conventions and finding little time for his own business. Louis Pitcher, executive vice president, is busy addressing state conventions and putting in the finishing touches on the executives meeting of the USITA to be held in Chicago May 25-26. Attendance of over 150 is now assured.

▼ ▼

The name, Akono Subusu, was a total blank in our minds until a few days ago. Received in a letter from an old friend who was passing it on for our amusement, we had such a hearty chuckle that we decided to reproduce it in this issue. It gave us a good laugh when a laugh was really needed—you will find more about Akono Subusu on page 39.

TELEPHONE ENGINEER

MANAGEMENT - ENGINEERING - MAINTENANCE

Vol. 42 No. 5 **May, 1938**

CONTENTS

- Across the Editor's Desk..... 3
- "Tapping In" on Washington
  By Roland C. Davies..... 17
- State Convention Dates..... 18
- Air Conditioning for Telephone Exchanges
  By Realto E. Cherne..... 19
- Editorial 21
- Reverting Calls in Automatic Exchanges
  By Frederick L. Kahn..... 23
- Don't Forget the Ashes—Act XII
  Showmanship in Business
  By Zenn Kaufman..... 25
- Local Test Desk Operation
  By C. F. Curtiss..... 27
- State Conventions..... 31
- Line & Desk, Conducted by Ray Blain..... 34
- Monthly Station Barometer..... 36
- Long Lines, By R. A. Clark, Jr..... 40
- Rambler Rambles Again
  By J. A. Smith..... 46

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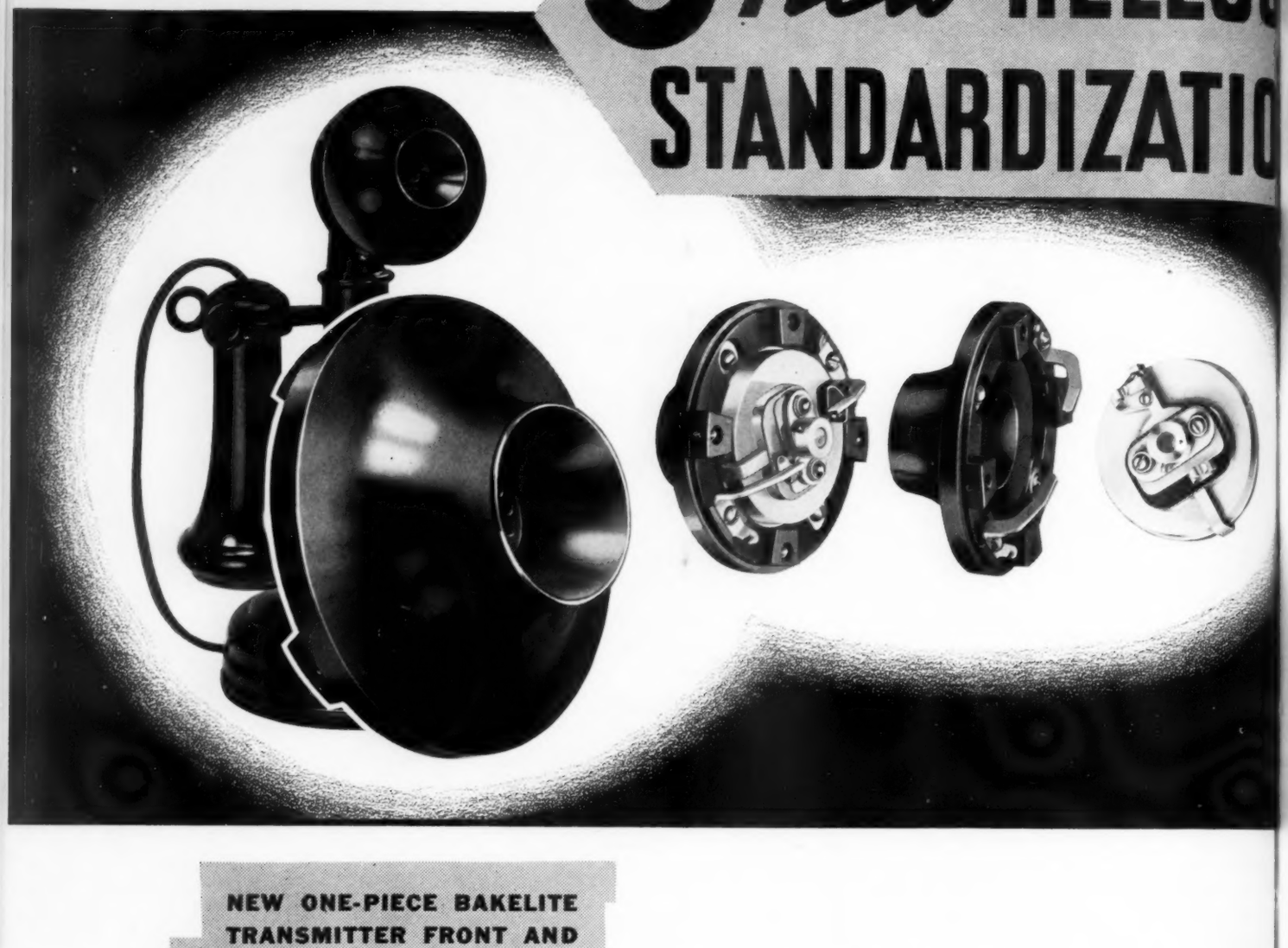

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TELEPHONE ENGINEER
MANAGEMENT - ENGINEERING - MAINTENANCE

MAY, 1938

"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

THE Telephone Industry accomplished two important achievements during the present Congress which now seems to be slated to adjourn during early June—the elimination of a proposal for the industry to bear the expense of installing and maintaining lights and markers on telephone poles along civil airways and near airports and the consideration by the Senate Agriculture Committee of a program which would compel the Rural Electrification Administration to compensate Independent telephone companies in rural sections in the case of inductive interference damage from REA power projects.

These two accomplishments give the telephone industry a perfect batting score in legislation for the present session of Congress. The plan to light telephone poles was contained in the Civil Aeronautics Authority bills before the Senate and the House and would have constituted an enormous expense upon the telephone industry. But as the result of the proper presentation of the situation to the Senate and House committees which drafted the Aeronautics bill the Bell System and the United States Independent Telephone Association succeeded in the revision of this plan. In the House bill the provision (Section 1108 of the Lea Civil Aeronautics Authority bill) was eliminated and in the Senate bill (Section 1101 of the McCarran measure) the expense of lighting the telephone poles was placed on the new Civil Aeronautics Authority as its responsibility. In the final enactment of this legislation it was considered that either the House bill's elimination of the provision about lighting of telephone poles or the Senate measure's plan for the Civil Aeronautics Authority to assume its cost would prevail.

● The Independent Telephone Industry had an excellent opportunity to present a complete picture of the harmful effects of inductive interference from Rural Electrification Administration power projects to the rural telephone lines with grounded systems in many sections of the country. At a hearing before the Senate Agriculture subcommittee on the Sheppard bill (S.3456), which would provide REA compensation of such telephone lines for any damages, spokesmen of the industry, including President John H. Agee of the National Association and leading telephone representatives of the Independent industry in Virginia, South Carolina and Tennesee, depicted the value of telephone communications to the farmers, the status of rural telephone companies in operating their services at the lowest rates for farmers and a number of instances where telephone service had been disrupted by the REA power line interference. It was indicated that the Senate subcommittee, composed of Senators Bulow of South Dakota and Gillette of Iowa, both Democrats, and Frazier of North Dakota, Republican, would probably render a favorable report on the measure which was sponsored by Senator Sheppard, Democrat, Texas. While it is not expected that the measure can be enacted at the present session, it was considered likely that it might be revived for Congressional action at the next session which commences next January.

Outside of the Congressional developments, there has been little importance in Washington for the Telephone Industry. Affairs at the Federal Communications Commission have produced no major actions or decisions.

THERE appears no chance that the FCC will draft its Final Report on the Telephone Investigation for submission to Congress at this session. The task has proved too important an undertaking for speedy formulation of the Final Report, not only because of the review by the Commissioners of the bulky evidence and the 1100-page Proposed Report of Commissioner Paul A. Walker and the Telephone Investigation staff but also due to the known division of views among the Commissioners on the charges against the telephone industry, especially the American Telephone and Telegraph Company, and recommendations for greatly expanded regulatory powers for the FCC which were contained in the Proposed Report of Commissioner Walker.

The Proposed Report of Commissioner Walker and the Investigation staff will not be printed as a Senate document. The Senate Printing Committee evidently decided that it was a bad precedent for Congress to publish at considerable expense such a bulky report, when it did not represent the final opinion of the Commission. However, the FCC itself authorized the publication of the Proposed Report and it is expected that it will be ready for distribution in early June. There have been a number of requests from state commissions, municipal regulatory bodies, students of telephone regulation and universities and colleges so that, when the Proposed Report is printed, the FCC will be able to meet these requests for copies of it.

The Proposed Report also will undoubtedly be distributed to every member of the Senate and the House.

● On the labor front, the telephone industry can observe considerable interest the oral argument to be held before the National Labor Relations Board during the latter part of May on the controversy between the International Brotherhood of Electrical Workers, A. F. of L. union, and the Independent Telephone Operators' Union for operators of the Wisconsin Telephone Company. *Despite the fact that the Independent union claims to represent 2,400 out of the 3,200 operators of the Wisconsin Telephone Company, the Labor Board examiner has recommended to the Board that it rule the Wisconsin Company should cease and desist from granting recognition to the Independent union as the representative of its employees for collective bargaining.* The Wisconsin Telephone Company and the Independent Union are attacking the examiner's report in their oral argument before the Board on the grounds that it was not based upon the evidence and testimony presented in the two-week hearing at Milwaukee. The A. F. of L. union has sought to have an election of telephone operators to choose their union on the basis of exchanges, while the Independent union feels the election should be on a state-wide basis.

Independent Telephone Industry Tells Congress Of REA Interference

THAT, even though the development of rural electric power service through the R.E.A. is highly beneficial, the power operations should not destroy an equally valuable and important service for the farmers of the United States — telephonic communications—was the message given by John H. Agee, president of the United States Independent Telephone Association, to the Senate Agriculture Committee in a statement urging approval of the Sheppard bill to provide that the R.E.A. compensate Independent telephone companies for damage through inductive interference.

● Three leaders in the Independent telephone field—B. L. Fisher, president of the Lee Telephone Co. of Virginia and vice president of the U. S. Independent Association (USITA), Frank S. Barnes, Rock Hill, S. C., Telephone Co., president, and South Carolina Association head, and James N. Cox, chairman of the Tennessee Association and president of the Southern Continental Telephone Co.—explained in testimony before the Senate committee that the small Independent companies had been furnishing fine and satisfactory service for 7 years to the farmers at very lower rates over grounded telephone lines. They described the size and financial situation of the small Independents and mutual farmer companies which prevented any raising of large capital to rehabilitate their systems and also told the Senate body that the farmers could not pay rates comparable to those in cities and towns so that the plant of the telephone companies serving the rural areas naturally had to be of the less modern but still satisfactory grounded wire types. Examples of telephone service being destroyed or badly disrupted in a number of rural sections through the inductive interference of REA power lines was given the Senators by the Independent industry spokesmen, while Mr. Fisher cited that in Virginia the private power utilities had adopted a policy of reimbursing the rural telephone lines for any damages resulting from power line construction.

Administrator John M. Carmody of the Rural Electrification Administration declared that the expense of modernizing rural telephone lines which were using obsoleted systems of a vintage of 40 years ago was too great a burden for the REA power projects to assume. He was joined in his views by REA assistant general counsel Lambertson and REA regional engineer Creim, all the REA officials asserting that they had received no complaints from farmer mutual telephone companies against the REA inductive interference but that it came from the Independent stock companies.

● USITA President Agee told the Senate group that "it should be borne in mind that in thousands of communities in the United States telephone service has been furnished by Independent companies for many years at rates so low that there has never been an adequate interest return on the investment. Out of 6,258 small Independent telephone companies we believe that fully 80 percent are operated as either mutual companies in which no profit has ever been made or by owners who have been content to make only a living from the operation of the business; in other words these owners have furnished a satisfactory quality of telephone service to the community without a profit." ***Mr. Agee countered a proposal of REA Administrator that a new provision of the Reconstruction Finance Corporation act will permit telephone companies to borrow funds from the government to reconstruct their lines through metallicized systems.*** He told the Senate subcommittee that the provisions of that statute predicates the RFC loans upon the ability of the borrower to repay the government advances and small farmer telephone companies would find this hard to meet as well as to increase rural rates to meet this added investment burden.

The controversy between the REA and Independent telephone industry probably will result in a compromise. The compensation form, as suggested by Mr. Agee, looms as the settlement result—that the REA projects finance the materials for metallicizing the rural telephone lines and the telephone companies furnish the labor. The decision over such arrangements would be left up to the state commissions.

CONVENTION SCHEDULE

United States Independent Telephone Association: Conference of Class A and Class B Companies, Edgewater Beach Hotel, Chicago, May 25 and 26.

Pennsylvania State Telephone & Traffic Association, Yorktowne Hotel, York, June 2, 3 and 4.

New York State Telephone Association, Seneca Hotel, Rochester, June 7, 8 and 9.

Washington Independent Telephone Association, North Bend, Washington, June 24 and 25.

Michigan Independent Telephone Association, Hotel Olds, Lansing, July 27 and 28.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, Sept. 21, 22 and 23.

Regulation Power of FCC Over Circuits

WHETHER the FCC will confine its regulatory supervision under section 214 of the Communications Act to the scrutiny of construction of interstate toll wire plant or will assume jurisdiction over the extension of interstate telephone service over new circuits is a highly important question which the Commission may decide in the near future.

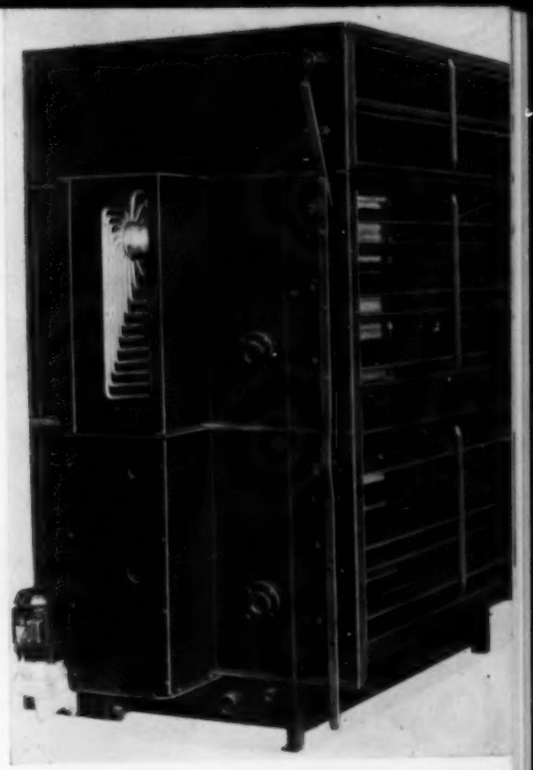
The issue has arisen in two cases. One involves the extension of the service of the Mackay Radio and Telegraph Company in Baltimore, Md., through a leased circuit that linked the Baltimore office with its radiotelegraph station at Washington, D. C. The other relates to whether the FCC has the right to pass upon the construction of interstate toll wire plant of the Southwestern Bell which may be used in a minor respect for interstate toll service in Texas. The latter case has not yet come before the FCC in a hearing, but has been the subject of lengthy briefs by the Bell Sys-

(Please turn to page 33)

Air Conditioning For Telephone Exchanges

By REALTO E. CHERNE*

*Application Engineer
Carrier Corporation
Syracuse, New York



Factory built combination spray and surface dehumidifier. Small top section is for bypass arrangement. Note bypass dampers and dampers across the dehumidifier face for use under partial load conditions.

PART II AND CONCLUSION

Most of the earlier installations were built up central station systems with spray type dehumidifiers or humidifiers and ammonia refrigeration with baudelot or shell and tube coolers. More recently the tendency has been to use direct expansion coils or water coolers and spray or surface conditioners. Where surface conditioners are used, it is necessary to include some means of adding moisture to the air for winter operation. The most general method is to spray a small quantity at low pressure over the surface of the cooling coil, thus wetting the coil and exposing large wet surfaces to air.

New York Telephone Company Walker-Lispenard Building*

Of special interest, because of its magnitude, is the air conditioning installation made in the Walker-Lispenard Building, 32 Sixth Avenue, New York City. A total of about 160,000 sq. ft. of floor area, being sections of ten of the 26 stories of the building, are conditioned. Most of this space is now used or is projected for use for long distance telephone operating rooms.

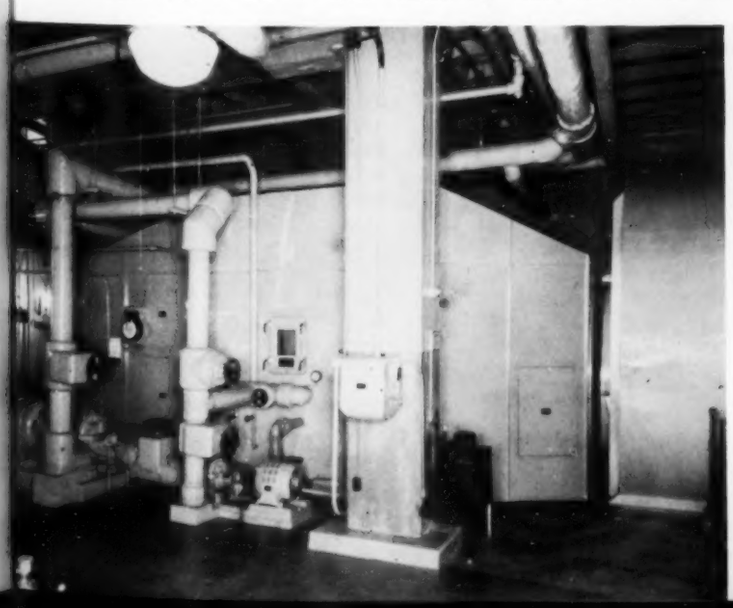
The system was designed with some flexibility in capacity to allow for experimentation in the matter of temperature and humidity conditions both summer and winter.

A huge apparatus, complete with spray type dehumidifier, preheaters, reheaters, filters, supply fan and return fan is located on the twenty-sixth floor of the building. Two vertical masonry shafts, one for conditioned and one for return air, extend down to the fourth floor which is the lowest one conditioned. On each of the ten floors having operating room space, there is a booster fan which mixes a quantity of room air with the conditioned air taken from the shaft before supplying the entire quantity to the conditioned area. These fans vary somewhat in size, but have a combined capacity of approximately 250,000 cubic feet of air per minute.

Two centrifugal refrigeration machines, having a combined capacity of about 500 tons, are used for cooling the water sprayed in the dehumidifier. These are located in the basement. A limited amount of well water, supplemented by city water, is used for condensing purposes.

The air is distributed by use of an overhead duct system and adjustable pan outlets. In general, the main trunk supply ducts extend between two operating boards which face each other. The return ducts are located on either side of the supply line.

The operation of this system over a number of years has demonstrated the necessity of maintaining proper conditions twenty-four hours of the day, year round (originally sixteen hour daily operation was tried as an experiment). It was also found that considerable variation in temperature and humidity is allowable provided changes are made gradually following seasonal weather changes.

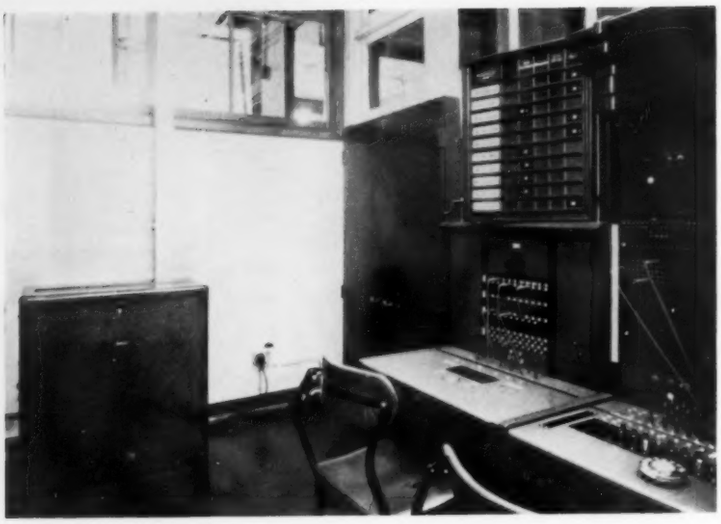


Typical installation of central station spray type conditioner, fan, pump and auxiliaries.

Design Features

In the rapid development of his industry, the air conditioning engineer has, of necessity, studied the peculiarities of many other industries. The fundamentals of the science are the same in all cases and a Btu is a Btu whether considering a telephone exchange, theatre, department store, or a textile mill. Application details, however, vary widely

* Refer to "Air Cooling in a Telephone Exchange," April, 1932, issue of REFRIGERATING ENGINEERING.



Carrier Portable Air Conditioning Unit as used in telephone exchange in England.

and most installations are "tailor made" for the building or process being considered.

Selection of air handling and refrigeration equipment for telephone exchanges does not require calculations any more involved than most comfort installations. A few features which differ from office buildings, theatres and other comfort applications, follow:

Discontinuance of Service is Costly Great effort is expended to prevent discontinuance of telephone service due to equipment failure; service must be available twenty-four hours per day every day of the year. In addition to the dependability there is the question of loss of revenue if lines are out of service, even if only for short periods of time. The air conditioning equipment must be equally dependable, and be designed for continuous service. This may involve duplicate pumps, duplicate air compressors (for control system), and possibly a division of the refrigeration capacity into two or more machines.

Effective Air Cleaning Devices The importance of elimination of dust and dirt has already been emphasized. All air supplied to the conditioned space should be filtered. The type or make of cleaning device to use for a particular installation will depend on the cubic feet of air to be handled, apparatus room space conditions, nature and quantity of impurities encountered, and, of course, the economics of the situation. Cleanable as well as throwaway, dry or viscous filters, and automatic viscous filters have been applied and each has its field of application. The important thing to keep in mind, again, is the twenty-four hour day year around service.

An important matter which is not always fully considered is the proper location of the outside air inlet. Care should be taken to avoid surface dirt, dirt which settles behind parapet walls, on roofs, and impurities issuing from exhaust systems or stacks.

Air Distribution The usual design problems of distributing the air over the entire conditioned space to prevent "dead spots" and temperature variations of any magnitude, and, in the case of manual switchrooms, to prevent drafts, must be fully considered. In addition, there is the problem of installing ducts which clear all telephone equipment. A comparatively recent development of a type of outlet which provides good distribution, without drafts, with high temperature differentials between room and supply air, somewhat simplifies the latter problem (see Fig. 1). With the higher differentials, much smaller air quantities may be used; consequently, the ducts are smaller.

Automatic Control of Conditions Capacity control to provide for variations from peak to light loads is essential. Most modern systems are provided with suitable control devices which will automatically vary the cooling and de-humidifying or heating and humidifying capacity as required by changing outdoor conditions or internal heat loads. Provisions can be made for automatic changeover from summer to winter conditioning and also for varying the indoor conditions in response to outdoor conditions for the purpose of obtaining operating economy.

Air Conditioning Equipment Available A broad classification of the hundreds of items which comprise a complete air conditioning system follows:

1. Air handling apparatus, including fans and drives, dehumidifiers (spray, surface, or dehydrators), heaters, filters and humidifiers.
2. Refrigeration apparatus, including compressors and drives, coolers, condensers, cooling towers, evaporative condensers and all auxiliaries.
3. Ductwork, including ducts, dampers, outlets and apparatus casings.
4. Pumps and piping (steam, water, refrigerant).
5. Insulation and isolation.
6. Controls, automatic or manual.

Description of each of the several types of the many items of equipment would resemble a manufacturer's catalog. Thus, a few of the more generally used pieces of apparatus are shown in the pictures, Figs. 1-6 inclusive. The description is limited to the captions and the following mention of some of the newer developments.

Improved Air Distribution Methods One of the principal developments which has, in the past few years, done much to reduce the cost and facilitate the installation of air distributing systems, is the design and perfection of higher pressure air outlets. If these outlets are properly applied they not only allow a reduction of supply air to from ⅓ to ½ of former design quantities, but also give better distribution and diffusion of the air over the entire conditioned space. Outlets of this type are shown in Fig. 1.

Safety Refrigerants and Direct Expansion Systems The industry has spent many years and countless dollars endeavoring to develop refrigerants and compressors which would eliminate the hazards and poor operating economy of some of the older ones. Freon ($C Cl_2 F_2$), Carrene No. 2 ($C Cl_3 F$), and water vapor, because of their safety characteristics, are now the most commonly used refrigerants in comfort air conditioning work: Freon for reciprocating compressors, Carrene No. 2 for centrifugal compressors, water vapor for centrifugal compressors and steam jet machines.

Development of Freon, together with equipment for its efficient use and control of system capacity, has also resulted in considerable reduction in cost of the smaller size systems when direct expansion is used. While some cities place restrictions on the use of any direct expansion refrigerant, many allow use of comparatively large quantities of Freon.

Fig. 2 shows two sizes of Freon compressors; Fig. 3 shows multiple compressors connected to direct expansion coils in a unit conditioner.

(Please turn to page 37)

Editorial

Continuing Property Records, Original Cost, Straight Line Depreciation Not Practicable for Independent Companies

EXPERIENCED telephone accountants and engineers have presented many sound and common-sense arguments why the uniform system of accounts for telephone companies having annual operating revenues exceeding $50,000.00, as promulgated by the Federal Communications Commission, calling for installation and maintenance of continuing property records on the basis of original cost and straight line depreciation on the group plan, should not be made applicable to Independent companies. Several state regulatory commissions have ordered adoption of this system by all telephone companies having in excess of $50,000.00 operating revenues.

It is the opinion of many Independent telephone men that the above requirements of the proposed system might be made applicable to large telephone companies operating vast, widespread and complicated systems; with large, well-trained plant and accounting staffs and with comprehensive accounting and property records dating back over many years. However, there is a marked difference between operations of these large companies and those of Independent companies, many of which are made up of a group of small exchanges. Operations of Independent companies are confined, in the most part, to small communities and they do not have large accounting and engineering staffs. Furthermore, in most instances, they do not have revenues sufficient to undertake these requirements. Neither do they have comprehensive property records covering past operations in detail. Therefore, there is little doubt that the installation and maintenance of continuing property records on the basis of original cost and adoption of straight line depreciation on a group plan by Independent companies would be so burdensome and expensive as to greatly outweigh any benefits that might be derived from such accounts and records.

If an attempt were made to meet the requirements of a continuing property record in its fullest sense, it would be necessary for the telephone company to maintain a record of each item of plant, no matter how small, showing such detailed information as locations of, dates, costs, sizes, types, changes in and retirements of each item. This would entail an untold amount of work for Independent companies, as records of many of these companies and those of their predecessors have not been kept to give the detailed information required to establish such a continuing property record. Consequently an expensive, thorough and complete inventory would have to be made to secure the necessary data.

As to keeping property records on an original cost basis, it would be impossible for many Independent companies to establish an actual original cost even after an inventory was made, because these companies and their predecessors have not maintained records to reflect original cost of individual items of property at the time they were first dedicated to public use. Consequently, any original cost that would be determined would have to be based upon estimate and guesswork, as well as averages, rather than facts. It is doubtful if the time and expense that would be spent in establishing and maintaining records based upon estimate only would and could be justified.

It has been indicated the value of continuing property records on the basis of original cost is that they would provide a means for commissions to make quick valuations for rate reviews. However, this theory would not seem to be the most practical and economic method of approaching the matter for Independent companies. As stated above, Independent companies, in the majority of cases, are composed of small exchanges and in a procedure involving rates almost any exchange could be completely in-

ventoried and appraised in a matter of a week or two, the expense of which would be ridiculously low compared with the expense of maintaining for years a continuing property record for that exchange. A continuing property record would be of no value to commissions if kept for a company as a whole, therefore it would seem that if to be of any value at all it would have to be maintained by exchanges, which would greatly multiply the cost.

Then, too, demands for rate reviews do not occur often. In fact, it probably would be safe to say that the average Independent exchange will not experience a rate review oftener than 10 to 15 years. Considering this, it seems common sense would dictate that it would be impracticable and uneconomical for Independent companies to establish and maintain continuing property records at tremendous and burdensome expense when an occasional inventory and appraisal at small cost could be made at the time such information was needed.

It is probably safe to say that few companies, few commissions and few communities would consent to have telephone rates determined on the basis of continuing property records kept over many years with the possibility of clerical errors creeping in. In view of this why then force the companies to go to the expense of keeping these records?

It also would seem the requirement of the proposed system of accounts for straight line depreciation on the group plan is not practicable for Independent companies. Straight line depreciation on the group plan, as we understand it, requires the making of future accruals to the depreciation reserve under a fixed and rigid rule or formula, the rate for which is based on a composite average service life of various distinct groups of property as the past experience of the telephone company might indicate.

The past is not necessarily a guide for the future, and to arrive at actual averages of future service life of units of telephone property, it would be necessary to accurately forecast just when each of the thousands of different pieces of equipment in a telephone plant will have to be retired because of one or more of the major elements of depreciation—wear, obsolence or inadequacy—what it will cost to remove them from plant and what their salvage values will be at that time. This, of course, is impossible. Certainly no one is capable of forecasting, with any degree of accuracy, the future depreciation of telephone property.

If past performance could be taken as a guide for future operations, straight line depreciation on the group plan still would be impracticable for Independent companies, because in most cases, they have used and are using equipment which is dissimilar in style, make and age and it would be impossible for them to get practicable and dependable mortality averages from such varied units of property, upon which a composite rate to use in determining depreciation accruals for the future could be based.

Following the straight line depreciation theory might result in reserving for depreciation substantially the same amounts during good times and bad times. We believe it is a recognized fact that during bad times the three major elements of depreciation listed above are decreased, while in good times these factors occur to a greater extent. It would logically follow then that accruals made to the depreciation reserve should be smaller in bad times and larger in good times.

In view of the above, it would seem Independent companies are logical in their stand that, while the above requirements of the proposed system of accounts may be practicable for large telephone companies with widespread operations, with a large number of similar units of property so that dependable averages might be obtained, and with comprehensive property records, they are impracticable for Independent companies which operate small exchanges in restricted communities with limited personnel and meager property records covering past years. A company with one switchboard cannot get dependable averages, but a company having five hundred might be in a position to obtain acceptable averages for depreciation purposes.

It readily can be seen that the installation and maintenance of such detailed and complicated records would require Independent compaines to employ larger and skilled accounting and plant staffs as well as to incur other expenses, which is just impossible for them to do. *Any increase in the accounting expenses of telephone companies must be borne by customers. If regulatory bodies wish to lessen the burden on the public it certainly cannot be accomplished by increasing the cost of rendering service.*

It should be stated here, and we believe this to be the opinion of Independent telephone companies, that the above remarks are not made in criticism of the underlying principles of maintaining *reasonable* property records, original cost or straight line depreciation, but rather to emphasize the fact that compliance with the rules as presently laid down is not practicable for many telephone companies and that the benefit, if any, that would be gained if they were adopted by these companies would be greatly outweighed by the expense involved to install and maintain the necessary records.

In view of the above, we believe commissions should give careful consideration to the serious effect these provisions of the proposed system of accounts would have on Independent companies before ordering that they adopt them.

Reverting Calls In Automatic Exchanges

PART II AND CONCLUSION

By FREDERICK L. KAHN

Equipment Engineer,
Automatic Electric Company

DIRECTORY INSTRUCTIONS

In exchanges serving party lines on a terminal-per-line basis, all stations connected to the same line usually have similar numbers, i.e. the numbers are identical except for the last digit (or letter). Hence, in systems of this type, it is possible to cover the handling of the reverting calls by general directory instructions along the following lines.

For Reverting Calls by Special Numbers:

"The telephone numbers of all parties on your line are similar except that the last figure differs. To call a telephone on your own line, do not dial the directory number, but dial instead "19", then the last digit of your own number and the last digit of the party you want to call. Hang up your receiver; the bell of your telephone as well as the bell of the called station will then ring at short intervals. When the called party answers, your telephone will cease ringing. You may then take down the receiver and talk to the called party. If the called party does not answer within a reasonable length of time, lift the receiver off the hook for a second and replace it again. This stops the ringing and frees the line for another connection."

For Reverting Calls by Directory Numbers:

"The telephone number of all stations on your line are similar except for the last digit. After you have determined that the subscriber is on your own line, dial the number in the regular manner. When you hear the busy signal, hang up your receiver to allow the other party's bell to ring." (This should be followed by instructions relative to the answering of the call, which depend upon whether the system provides for ringing the calling station or not.)

In exchanges serving party lines on a terminal-per-station basis, the directory numbers of the various subscribers connected to the same line usually have no similarity at all. Hence, general and definite reverting call instructions cannot be issued along the lines indicated before. The methods of instructing party line subscribers in this case differ. Some operating companies will send party line subscribers an instruction card (either to every subscriber or upon request only). This card shows the other numbers connected to the line, and gives instructions how to make calls to these numbers. This method is an expensive one for the telephone company as it requires reissuing these cards every time a party is added to or disconnected from the line.

Frequently, the telephone directory will merely state: "If when calling from a party line you think that the party you are calling may be on your own line, dial the operator and ask her to assist you in completing the call."

This instruction leaves it up to the subscriber to discover whether another party might be connected to his own line. Some companies are more frank

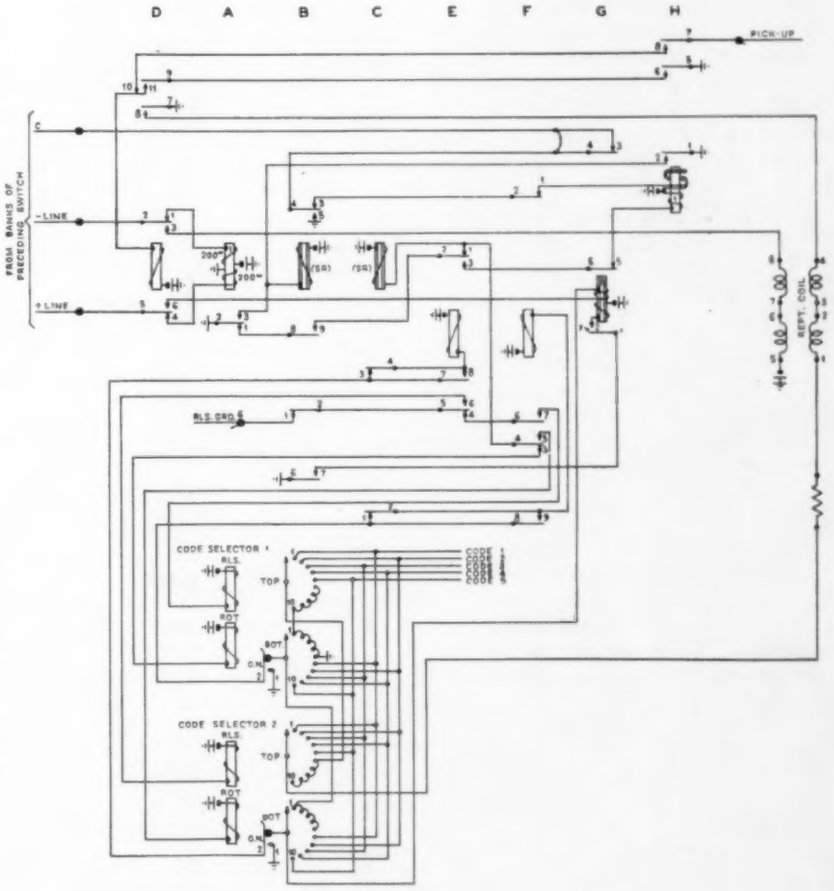


FIG. 3

in admitting that this puzzle cannot readily be solved by the subscriber, and therefore state in the directory: "If you are calling from a party line, and you encounter a continued busy condition, the party that you are calling may be on your own line. If this appears to be the case, dial the operator and ask her to assist you in completing the call."

In panel exchanges, the operator always completes such calls by asking the calling party to hang up, and then ringing the called party manually. In other systems, the operator will usually instruct the calling party how to make a reverting call by dialing.

Whenever reverting call instructions are of such a blanket nature, it can safely be assumed that reverting call traffic is of neglible volume.

Transmission

When two parties on the same line are engaged in a reverting call, the transmitters of both stations receive transmission battery from the same battery feed relay. In order to supply the normal amount of battery to each transmitter, it would be desirable to use a battery feed relay of lower resistance than the standard battery feed. However, for reasons of economy and convenience, the regular pulsing relay of the reverting call switch, or the line relay of the line (2x200 ohms in 48-volts systems) is used on reverting calls. This reduces the transmission efficiency on reverting calls. However, this deficiency is offset by the fact that both stations are on the same line so that the transmission loss between the two stations is much smaller than the average loss on a call between different lines. General experience indicates that this arrangement is quite satisfactory.

Metering

Multi-party service in the United States and Canada is generally given on a flat-rate basis; no charges are made for individual calls. Hence, there is no requirement to meter such calls. In some exchanges, full-automatic two-party lines are served on a message rate basis. Where such service is provided, reverting calls are not charged; sometimes reverting calls between parties on the same two-party line are prevented by special circuit arrangements.

In the European system of party lines previously described, the elaborate line adapter circuit used makes it possible to charge reverting calls on a message basis, if such rates are used for other calls.

CIRCUITS

Special Number Method

Fig. 2 shows a simple reverting call circuit arranged for two-party divided ringing service, for inspector's ring-back and calls between main and extension stations on individual lines. This circuit is a good example of the principle of the reverting call switch.

The circuit is normally connected to a selector level. When the special reverting call number such as "19" is dialed, one of these switches is selected; relay A operates and closes the circuit to B. As this switch is arranged to serve not more than two-party lines, only one ringing combination is required for which this circuit normally provides. Hence, after seizure of the circuit, the calling subscriber need not dial any additional digit but will immediately hang up. This will release relay A, while relay B remains operated thru a holding circuit closed on springs 5 and 6. Relay B also keeps the release trunk grounded, thus keeping all other switches in back of this switch operated.

The circuit is now closed for the operation of relay F which starts a special reverting call interrupter. This reverting call interrupter, which is common to all switches, alternately grounds interrupter lead 1 and interrupter lead 2. When interrupter lead 1 is grounded, relay D is operated and in turn operates G. With D and G operated, ringing current is placed on the negative side of the line and ground on the positive side of the line. When interrupter lead 2 is grounded, relays C and G are operated, placing ringing current on the positive side of the line and ground on the negative side of the line. In this manner, ringers connected to the negative or the positive side of the line are alternately operated. If the switch is used for making a reverting call on an individual line, the ringers are bridged across the line and will operate in either case.

If the receiver is removed at one of the stations while ringing current is connected to the line, the ringing trip relay E will operate at once; it trips the ring, locks itself and opens the circuit to relay F thus stopping the in-

(Please turn to page 30)

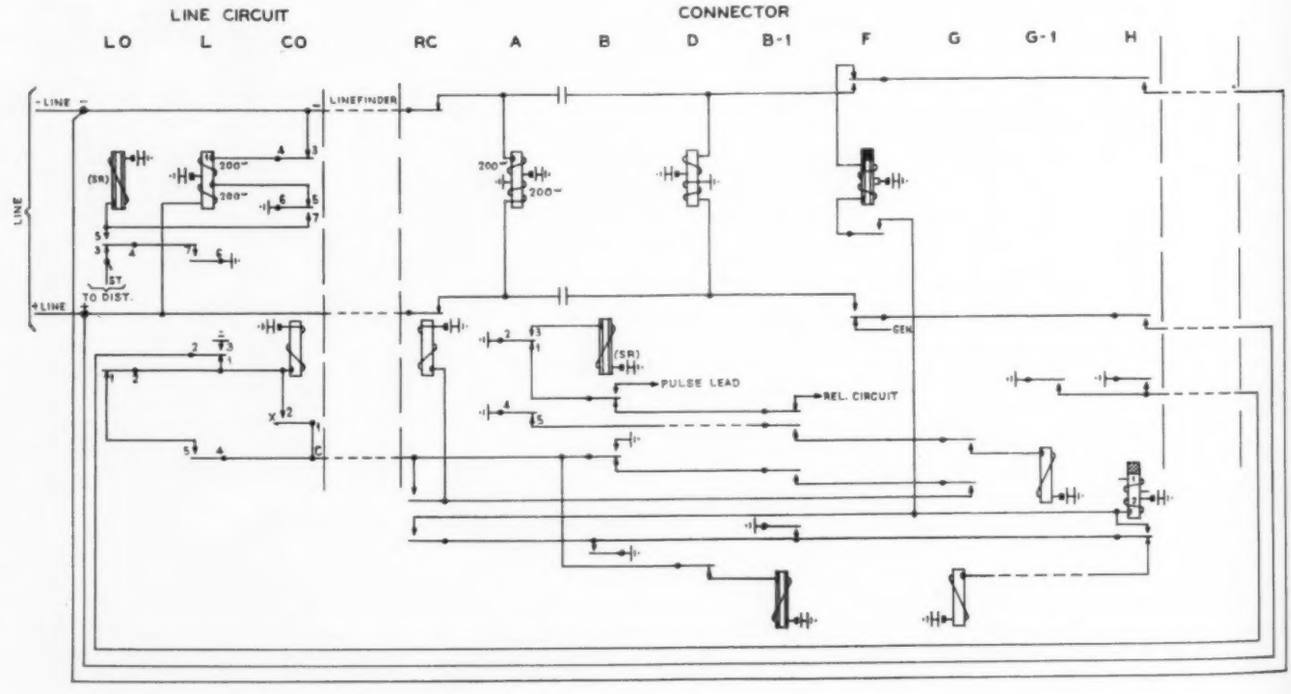
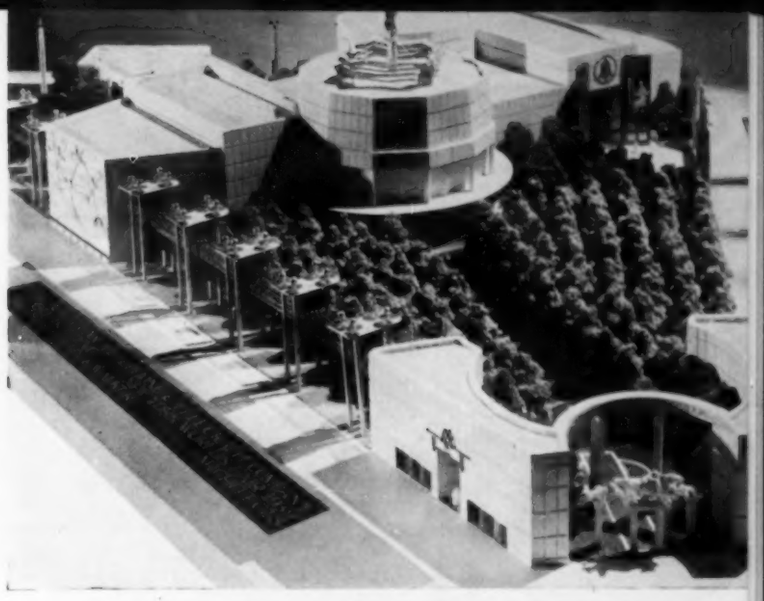


FIG. 4

Don't Forget the Ashes



Issuance of their model for the New York World's Fair scheduled for 1939 is very excellent showmanship as practiced by the Bell Telephone System. This photograph will be reproduced editorially all over the world.

ACT XII
Showmanship in Business
by
ZENN KAUFMAN

THEY used to say of David Belasco that if he put an ash can on the stage it was probably full of ashes. That was probably an exaggeration—but a perfect reflection of Belasco's passion for *realism* and one of the things that helped establish him as one of America's greatest showmen.

Roxy, capitalized it with sound effects—even before the talkies—when, to dramatize a scene in a ship's engine room, he connected a microphone to the boiler room of his own theatre and brought audiences the dull rumble of the engines on the screen. A timely example of a show come to life was told in Time recently. One of the comic strips had told how the hero, working in a gas station, had foiled a bandit by squirting the hose in his face. A week later in Brooklyn, N. Y., the scene was actually re-enacted—a lucky pump man recalling the cartoon strip.

● Real people—real conversations—real places—give, first, attention, and second, authenticity. A good example, in reverse, was Gene Tunney—a forthight young boxer who never was popular with the fans because he lacked the atmosphere of a "real fighter." He was alleged to have read books. No one even *proved* that he ever read a book—but he couldn't disprove it. Hence his unpopularity. The day before the Dempsey fight his camp was visited by a Dempsey scout who reported "Jack—he's a pushover—I seen him reading a book."

Associated Press dispatches the next day showed the scout's appraisal to be 101% wrong. But the public never forgave Gene for winning. To the fan he was never a "real" fighter.

Another index is the problem that advertising photographers have in engaging models for character roles. Doctors *must* have goatees. Personally I have three doctors, none of whom look like doctors. One looks like an actor—I think he *is* a crook. But in ads doctors must *look* like doctors. Similarly with debutantes. They're usually posed by gals who live on the wrong side of the railroad tracks—because real debs—who might like to pose just for the hell of it—look like chorus girls or hicks. Cohen Bros, Jacksonville Department Store, brought the Old Masters back to life by having girls with old-fashioned coiffures pose behind large pictures frames . . . Realistically showing the versatility of the Cohen Bros. hairdressing department.

● By actually sending you a specimen check for $150—a check which reads: "Every month For Life"—The Connecticut Mutual Life Insurance Company takes their endowment policy out of the realm of intangibilty and makes it seem real. It's so realistic, in fact, the few receivers don't sit back and think: "Boy, I wish it were true!"

Use a few sound effects here and there. What's a football game without a band and cheering? Sound is part of the show—whether it be the soothing restful lullably in a restaurant—or something material and stirring for your next sale's meeting. Atmosphere is mighty important. Just think how dull a ship's sailing would be without those few strands of confetti.

A pendulum swinging back and forth in a window added emphasis and realism to the legend above it which read: "Time to be playing—not shopping—*"Save time shop by telephone."*

Merchants can make money by the proper use of the telephone for selling and by properly coaching retailers in the art of persuading customers to order by 'phone. One 'phone company representative in presenting this story to dealers carried a portfolio entitled, "Make the Telephone Make Dollars for You." Across the front of this booklet, he pasted a stream of dollar bills in order to realistically dramatize his point.

The New York Telephone Co., put an actual rain storm in a window display on the theme of "Do your shopping by telephone in rainy weather." A small mechanical pump lifted water to the top of the display and trickled it downwards before your very eyes. A crowd-stopping window if there ever was one. By displaying a group of old fashioned phones, one company realistically portrayed the rapid advances made by the telephone industry.

● A Department store advertised a huge hosiery sale in the newspapers, urging people to buy by 'phone. They placed a switchboard in their main street window with operators busy all day taking orders for hosiery.

Put realism into your next sale contest. A company in Kentucky gave trips to the Great Lakes Exposition, as contest prizes and mailed picture postcards to all employees from Cleveland. The cards gave a realistic impression of the good things in store for the contest winners. Another company, running a "quota busters" contest let an employee break a huge pane of glass with a hammer. On the glass was a bullseye—in the center was painted the word "Quota." The sales manager said, "Here's what we're going to do to that quota"—and bang!—the boy let the hammer fly. While dramatizing a sales contest as a baseball game, one company bought a box at the local

FREE: Just send a self-addressed stamped envelope and we'll send you a copy of the Showmanship Yardstick. A check list of Showmanship elements that you can use in your business—It's Free.

ball park and let weekly winners use it on Sundays.

Remember — a man standing on the corner can't sell a real dollar bill for 85c. Because he challenges realism. Take the hint and give your pubic "the real McCoy."

For the benefit of those readers who wish to hear Mr. Kaufman's famous talk on Showmanship, we include below his May speaking itinerary.

May 4—York, Pa.
5—Harrisburg, Pa.
10—New York City
11—New York City
12—New York City
13—New York City
17—New York City
18—Columbus, Ohio
23—New York City
24—Syracuse, N. Y.
25—Chicago
26—Atlantic City
27—Philadelphia
June 2—Aurora, Ill.

For the exact time and place, please write Mr. Kaufman in care of this magazine.

PROGRAM FOR CLASS A & B CONFERENCE-MAY 25-26

Executives, accountants and commercial men from all parts of the country are planning to attend the Class A and B Conference of the United States Independent Telephone Association, May 25-26, Edgewater Beach Hotel, Chicago, according to executive vice president Louis Pitcher.

President John H. Agee will preside the first day, with Mr. Pitcher in the chair at the second and concluding conference on May 26. According to Association executives the idea of holding the conference as a strict business conference, has caused much favorable comment and will be unusually well attended.

We are reproducing the program and urge all telephone men to attend this conference.

PROGRAM

WEDNESDAY, MAY 25

9:30 A. M.—General Session.
(East Lounge)
President Agee in the Chair
STATEMENT PURPOSES OF CONFERENCE—John H. Agee, President.
PENDING LEGISLATION AND WASHINGTON AFFAIRS—Alfred L. Geiger, General Counsel.
OPEN FORUM.

2:00 P. M. General Session.
(East Lounge)
President Agee in the Chair
TOLL RATES AND COMPENSATION—Edwin M. Blakeslee, Chairman Toll Compensation Committee.
OPEN FORUM.

6:30 P. M. Directors' Meeting and Dinner.

THURSDAY, MAY 26

9:30 A. M.—General Session.
(East Lounge)
Vice-President Pitcher Presiding
DEPRECIATION—E. C. Blomeyer, Chairman Depreciation Committee.
DISCUSSION PROPERTY VALUATION.

2:00 P. M.—Accounting Conference.
(East Lounge)
Ranford Dunlap
Chairman Accounting Committee.
SUGGESTED SUBJECTS:
Accounting for Storm Damage Losses.
Social Security Tax Payroll Accounting.
Exchange Accounting.
Class C Accounting.

3:30 P. M. Commercial Conference.
(East Lounge)
Sam H. Shutt,
Chairman Commercial Committee.
SUGGESTED SUBJECTS:
Increasing Rates.
Public Relations.
Overcoming Sales Resistance.
Streamline Sales.
Adequate Rates.
Maintaining Hand Set Differentials.
Commercial Approach to REA Problem.
ADJOURNMENT.

William Harrison New A. T. and T. Chief Engineer

William H. Harrison, assistant vice president in the Department of Operation and Engineering of the American Telephone and Telegraph Company, was elected vice president and chief engineer, effective May 1. He succeeds Bancroft Gherardi, who retired last month.

W. H. Harrison

Mr. Harrison has been with the Bell System for 29 years, starting as a repairman for the New York Telephone Company in 1909. After several years in various plant capacities, he joined the Engineering Department of the Western Electric Company in 1914 and was assigned to circuit design work. In 1918 he went to the A. T. and T. Company's Engineering Department, and six years later was appointed equipment and building engineer. In 1928 he became acting plant engineer, and in 1929 plant engineer. In 1933 he was elected vice president in charge of operation of the Bell Telephone Company of Pennsylvania and the Diamond State Telephone Company, and later the same year was elected a director and appointed a member of the executive committees of both companies. He became assistant vice president in the O. and E. Department of the A. T. and T. in February of last year.

The peripatetic gavel of the Texas Association came home to the annual convention in Dallas, March 23.

The wandering symbol of authority, "hooked" by R. B. Still, formerly of Tyler, when that ex-president of the association moved to Illinois some five years ago, was returned by Louis Pitcher, national executive vice president.

"Still had hoped he would return some time, and figured he could keep control of the association by retaining his scepter," Pitcher explained on turning the gavel over to President Oscar Burton of Tyler at the close of the former's speech.

The gavel was a present of E. O. Blomeyer, now of Chicago, to the convention during his presidency in 1921.

Local Test Desk Operation

By C. F. CURTISS

Locating Line Trouble By Means of The Wheatstone Bridge.(Ctd.)

IN previous installments the Varley method of locating line trouble was discussed. Now the Murray loop test method, wil be considered. The Murray loop method of locating line trouble is a simple one, and is applicable when the bad and good line wires are composed of the same size, length and material.

To apply the Murray test. (1) Connect the ground (bad) line wire to the "X2" and the ungrounded (good) line wire to the "X1" binding posts of the Bridge. (2) Measure the total resistance of the circuit as a loop. (3) Connect the bridge test battery to ground as shown in figure 1. Set the ratio dial on M1000, which places 1000 ohms in the "A" ratio arm of the bridge. (4) Operate the rheostat dials until a balance of the bridge galvanometer needle is obtained. If a satisfactory balance cannot be obtained with the M1000, set the ratio dial at M100 or M 10 as required. The final setting used is the value of "A" in the Murray formula; $D=Rr/A+R$, where "D" equals the distance to the fault in ohms, "A" the ratio dial setting, "r" the total resistance of the loop, and "R" the rheostat reading.

● If "L" equals the length of the two line wires which are assumed to be equal and since "A" and "r" are porportional to the lengths, the distance to the fault becomes $D=L_2R/A+R$.

Example; Suppose that a line circuit consisting of 104 N. B. S. gauge copper wire having a resistance of 5 ohms per mile and 32 miles long becomes grounded, and a location test by means of the Murray loop is made and total resistance of the loop is found to be 320 ohms. With the ratio dial set at M 1000, a rheostat reading of 545 ohms is obtained, then (1) $D=Rr/A+R$ or $545x320/1000+545=113$ ohms, and (2) $DL_2R/A+R$ or $32\times2\times545/100+545=22.6$ miles to the fault, or simply $113/5=22.6$ miles.

It will be readily seen in the application of the Murray loop method of locating faults as shown in figure 1 that the complete loop forms two of the proportional arms of the bridge and bridge arm "A" and the rheostat "R" the other two arms, then the value of "X" or one of the arms is in the same proportion to the total resistance of the loop "r" as the value of "R" is to the total resistance of the two arms "A."

If the Murray test is made on a circuit of which the total length only is known, then the amount of the length must be substituted for the value of "L" and the 2 removed from the numerator of the foregoing formula $D=L_2R/A+R$.

In the case of locating a cross by means of the Murray test, connect one of the crossed line wires to the bridge "X2" binding post and a good wire to the "X1" binding post and join their distant ends together. Then connect the other wire of the crossed line to the bridge "GR" binding post and proceed with the test as outlined for locating a ground.

● The following is a method of locating a cross between two line wires by resistance measurements when the two crossed wires are approximately equal in resistance. Refering to figure 2, line wire No. 2 is designated "E" and "F," wire No. 3 "G" and "H" and the cross "C." First measure wire 2 from "E" to "F" as shown and assume a resistance of 330 ohms is obtained. Measuring 'E" to "H" through the cross as shown in figure "2A" a resistance of 396 ohms is obtained. Next "E" to "G" is measured as shown in figure "2B" obtaining a reading of 627 ohms. The resistance of the cross is obtained by substracting the result of the first measurement from that of the second, or 330 ohms from 396 ohms equals 66 ohms, and the resistance from the bridge to the cross on line wire No. 2 is calculated by dedlucting the resistance of the cross, or 66 ohms from the loop measurement of 627 ohms and dividing by 2, that is $627-66=561/2=280.5$ ohms and accordingly reduced to miles.

(Please turn to page 42)

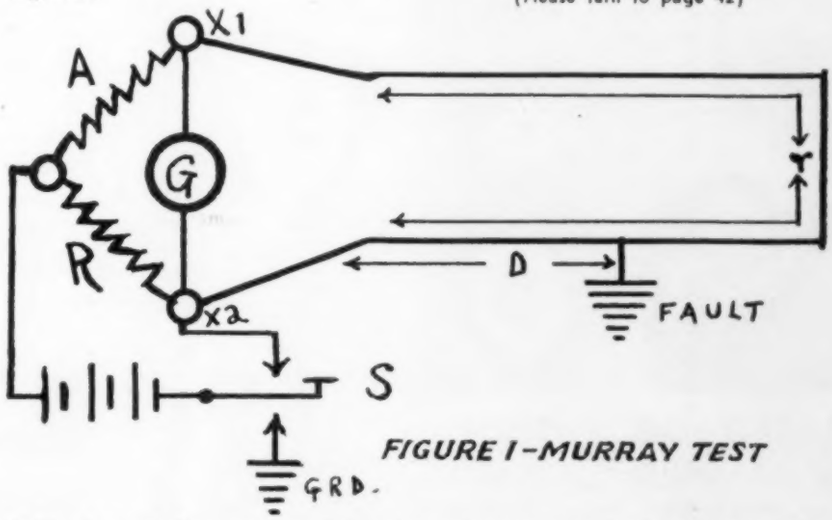
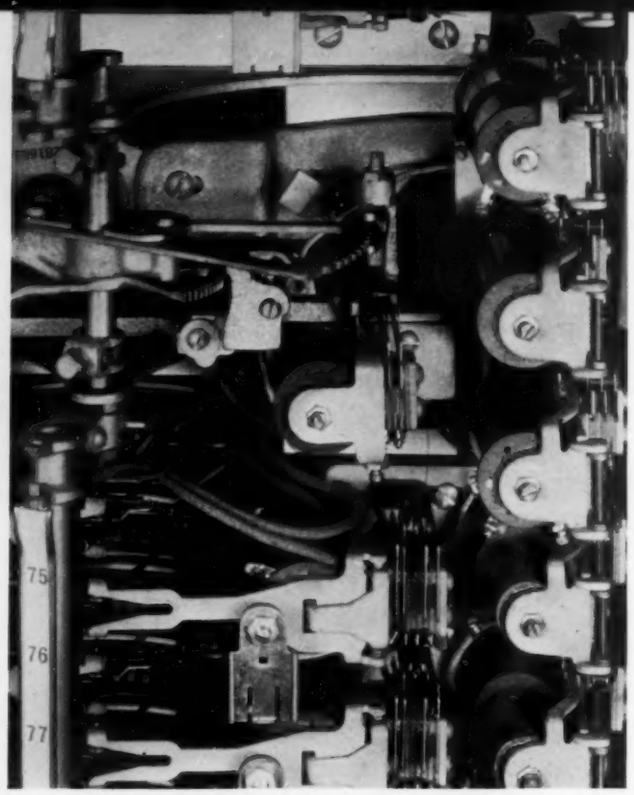


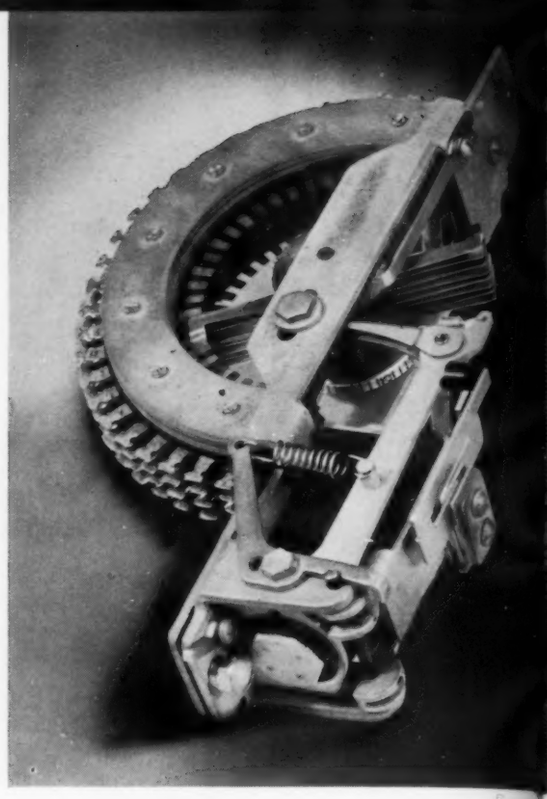
FIGURE I-MURRAY TEST

NOTE: First make loop resistance test in the regular manner, i. e., using the bridge ratio arms A & B and rheostat. Then set the "A" ratio on M1000 operate the switch "S" to ground and balance the bridge.



THE KEITH LINE SWITCH

A modern form of the plunger type line switch, widely used since 1905.



THE ROTARY LINE SWITCH

Used as primary or secondary line switch, line finder various other switching functions.

THE STROWGER SWITCH

The present perfected counterpart of the original Strowger "step-by-step" mechanism, used as line finders, selectors and connectors.

WHAT TYPE OF AU MA

Here is an authoritative answer by an o ion that ment — and supplies whatever type is ted to c

When a telephone manager plans to buy new automa ose of ot central office equipment, he plans an investment that sho quipment serve his company for a generation. It is natural, therefo uirements for him to investigate fully before he decides upon the typ included

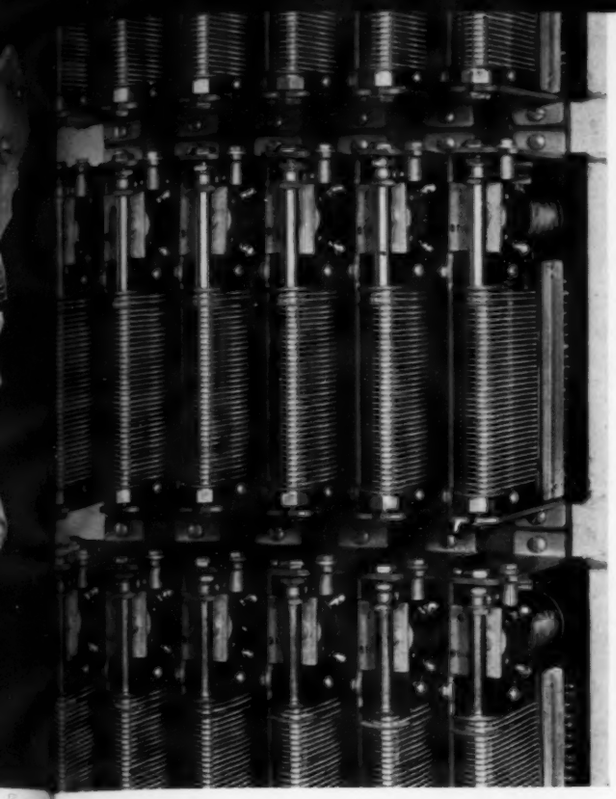
We welcome such an investigation because we are witch as m hampered by being able to supply merely a single type wh o. Ltd., Liv may have limitations in actual use. On the contrary, throu ose custo a continuous program of research, development and impro so licensed ment, Automatic Electric engineers have developed ma ype 17 swi types of switch mechanisms to meet various exchange requ referred. ments or customer preferences. These products include tary and plunger type line switches, relay switchboards With this various types and—most widely used of all—standard Strow ccupy the switches in many combinations. ustomer pr ons. We

It is our policy not only to offer our customers these p o consult fected products of our development laboratories, but eeds.

AUTOMATIC E

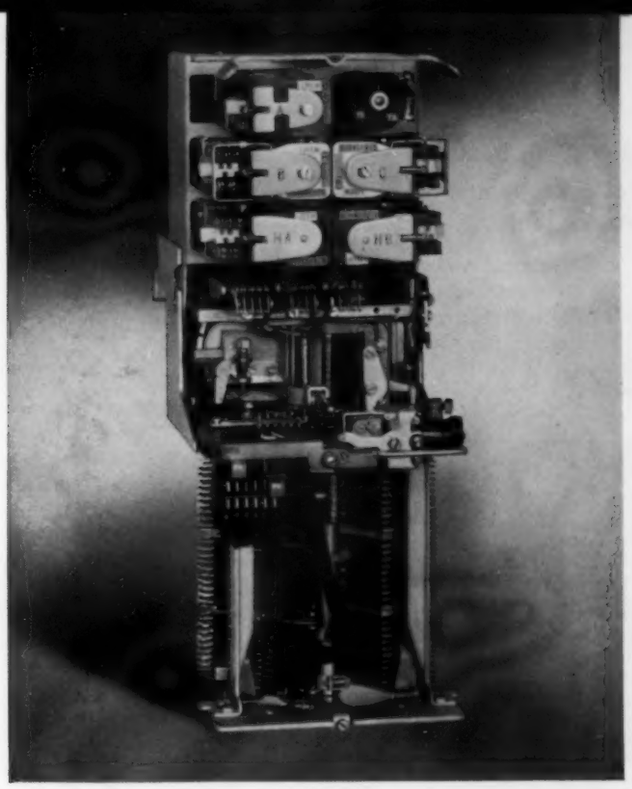
MAKERS OF TELEPHONE, SIGNA AND ELECTRICAL ENGINEERS, ERS AN

Distributo Possessions:
AMERICAN AUTOMATIC ELECTRIC 033 W. Van
Export Distributors: AUTO RIC SALES



THE AUTOMATIC ROTOR RELAY

newly developed relay for multi-contact control in lay type boards.



THE BRITISH POST OFFICE STANDARD SWITCH (TYPE 2000)

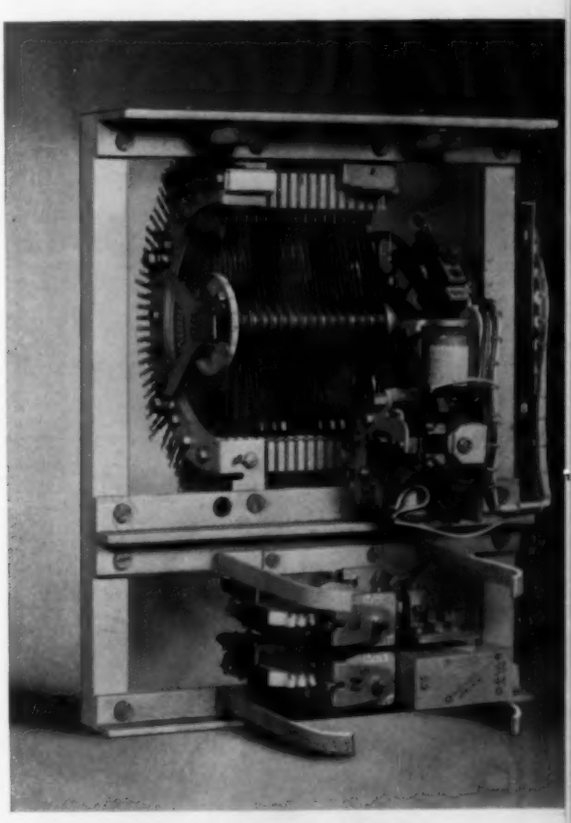
This switch has been adopted as standard by the British and Australian Post Offices.

MATIC EQUIPMENT?

ion that makes a wide variety of equip- ted to customer needs and preferences.

hose of other manufacturers here and abroad where such quipment has established definite merit and fills specific re- uirements of operating organizations. Among such products included the new British Post Office standard (Type 2000) witch as manufactured by Automatic Telephone & Electric o. Ltd., Liverpool, which we will be in a position to supply to hose customers who desire it within a few months. We are so licensed to manufacture the Siemens Brothers high-speed ype 17 switch for applications where a device of this type is referred.

With this wide variety of types at our command, we thus ccupy the position of being able to supply equipment to meet ustomer preference as well as local traffic and service condi- ons. We invite operating organizations and administrations o consult with us as to equipment that will best meet their eeds.



THE SIEMENS TYPE 17 UNISELECTOR

A high-speed switch designed for use with the Siemens Brothers No. 17 automatic system.

C ELECTRIC

SIGNA AND COMMUNICATION APPARATUS
ERS, ERS AND CONSULTANTS

tribut Possessions:
CTRIC 033 W. Van Buren St., Chicago, U. S. A.
AUTO TRIC SALES CO., LIMITED

Reverting Calls In Automatic Exchanges

(Continued from page 24)

terrupter and releasing relays C or D and G. This connects relay A to the line which will operate over the loop and will keep relays B and E operated. When the receiver is restored at the end of the call, relays A and B release; this will release the reverting call switch and all other switches operated for this connection. Relay E will release last so that relay B cannot be held operated over the previous locking circuit .

If the call happens to be answered when generator is not connected to the line, relay A will operate as it is connected to the line during the silent interval. Relay A will close a circuit to E; all other operations are the same.

Figure 3 shows a reverting call switch for use with five party bridged or ten-party divided code ringing. This circuit is arranged so that only the called station is rung in case of bridged ringing or if the ringer of the calling station is connected to the same side of the line as the called station. In either case, the ringer of the calling station will be operated each time the called station is rung so that the calling party has a definite indication when the called station has answered.

If, however, the calling station is connected to the opposite side of the line, this switch will ring both calling and called station simultaneously, the code of the calling station being sent out on one side of the line and the code of the called station on the other side of the line.

This is accomplished by means of the two minor switches (code selectors) in this circuit which are provided to store the digits representing the ringing code of the calling and the called party respectively. The wiring of the code selectors and the digits to be dialed are such that digits 1 to 5 represent the stations with codes 1 to 5 and ringers connected to the negative side of the line; digits 6 to 0, the stations with codes 1 to 5 and ringers connected to the positive side of the line. For stations with bridged ringing, only digits 1 to 5 are used. The digit corresponding to the code of the calling party must be dialed first.

When this switch is seized from the preceding switch, relays A and B operate. When the calling party continues to dial, the first digit operates code selector 1 in multiple with relay C. The code selector operates its O.N. springs as soon as it steps off-normal. At the end of the first digit, relay F operates and transfers the pulsing circuit so that the second digit dialed will operate code selector two. At the end of the second digit, relay E is operated.

Now, when the calling party hangs up, relay A releases which closes the circuit to relay H.

H closes a holding circuit for relay B which in turn keeps all switches in back operated. H also extends the pick-up lead to relay D. At the beginning of the next code cycle, ground on the pick-up lead will operate relay D which disconnects relay A from the line and extends the negative line circuit to the repeating coil and the positive line to relay G and thru relay G to the code selectors.

Considering first a call from station 1 to station 5, code selector 1 has its wipers on contacts 1, code selector 2 has its wipers on contacts 5. As stations 1 and 5 are connected to the line in the same fashion, only the code of the called station 5 is sent by the reverting call switch, the ringing circuit being as follows:

Ringing current (Code 5) is extended through the top bank of code selector 2 to the repeating coil primary winding and ground; ground is connected through the bottom wipers of both code selectors to relay G and the positive line. Ringing current (code 5) is placed on the negative line through the secondary winding of the repeating coil.

In case of bridged ringing, the ringing circuit is from battery on the secondary winding of the repeating coil, through the ringers across the line, to ground on the positive line. In case of divided ringing, the ringing circuit is from battery on the repeating coil, over the negative line, through the ringers on that side of the line to ground. Condensers in series with the ringers prevent the closing of the D.C. current. As soon as the receiver is removed at any station, the D.C. circuit is closed which permits relay G to operate; it trips the ring, opens the circuit to H; H in turn releases D. This reconnects relay A to the line to supply talking battery. Relay A holds B operated. When both parties hang up, relays A, B and G release, and in turn release all switches in back. The circuit of the

(Please turn to page 43)

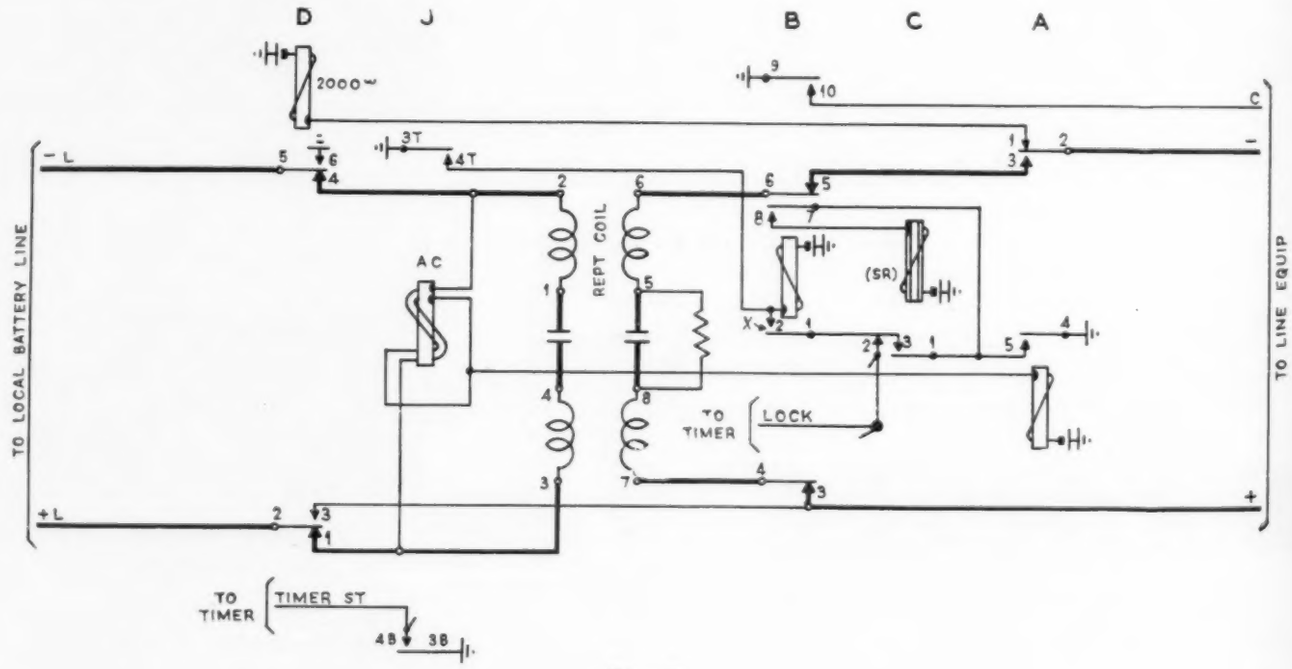


Figure 5

Telephone Associations Meet In Five States

The past thirty days have been busy ones among Independent telephone men. Most industrious however were state telephone association officers and speakers as five different Associations have held their yearly meetings during the past 30 days. Starting on April 12 at Iowa and following in order at Nebraska, Kansas, Ohio and Indiana; at time of going to press the Badgers of Wisconsin are gathering for their annual conclave of telephone men.

Most of the various state Associations had serious discussions on the R.E.A. situation and tax problems. Practically all of them passed resolutions favoring national legislation to help remedy some of these ills and urging lawmakers to act favorably on Senate Bill No. 3456 introduced in the Senate by the Hon. Morris Sheppard, Texas, and House Bill No. 9548 a companion bill, in the House of Representatives by the Hon. Morgan G. Sanders, Texas. Members of the Associations were urged to send copies of their resolutions to the lawmakers of their state, their utility commission and to the administrator of the Rural Electrification administration.

Executive vice president Louis Pitcher, of the National Association addressed all of the conventions held during this period on the subject "National Affairs." His paper and views received widespread publicity and was the highlight of several meetings.

Iowa Discusses REA

Convening at Des Moines in mid-April the Iowa Independent Telephone Association re-elected its present officers: president, A. J. Adams, Chariton; vice president, R. A. Phillips, Sioux City; vice president, G. E. Atkinson, Creston, and secretary-treasurer Chas. C. Deering. An increase in member companies by 35 was attributed by Mr. Deering as the result of the stand taken by REA officials which was quite serious in that state. In his report Mr. Deering, who has been actively working on this problem with officers of the United States Independent Telephone Association of which he is also secretary, gave a very complete picture of the REA situation and ended by urging all members to get behind legislative efforts to make inductive interference less a burden for the telephone man to carry both financially and physically.

Directors were re-elected with S. C. Dows, Cedar Rapids, selected to fill the unexpired term of J. M. Mitchell, deceased. A banquet and floor show followed by dancing provided entertainment for telephone men and their guests. President Adams in his address reviewed the association year and the victory attained by the Independents on the order of the Iowa commission and its stand on inductive interference affecting telephone companies.

Nebraska Meeting

Although many members were unable

This trio took a long time to study the North all-relay so made themselves comfortable. Nebraska Convention.

Mr. Rodormer of Reliable Electric Co. talking about a new cable terminal to Mr. Strosser, General Purchasing Agent of the Lincoln Tel. & Tel. Co.

The Registration Desk at the Nebraska Convention.

CAMERA IMPRESSIONS

By

RAY BLAIN

Cook Electric Co. at the Nebraska Convention. Chester Ruth on the left. Bob Miles of Kellogg with back to camera.

Nebraska Convention. Mr. D. R. Colby Statistician for the N. W. Bell Tel. Co. delivering his speech "Let's take a look at the record." By the aid of cleverly arranged charts he explained where the telephone dollar goes.

to attend because of a serious sleet storm just previous the meeting, the Nebraska Telephone Association held a very successful convention at Omaha, April 19-20. A different slant on inductive interference problems was advanced by President D. E. McGregor in his address when he advised closer cooperation with farmers and their problems with the idea that resulting inductive interference would be settled to the satisfaction of the telephone men in the not distant future.

Secretary George M. Kloidy in his report had no startling announcements other than to report a most successful association year. A number of other speakers were heard with a banquet climaxing the meeting.

Mr. McGregor was reelected president as was Mr. Kloidy as secretary. A. B. Clark, Columbus, succeeded B. G. Miller, Crete, as vice president.

Kansas Convenes at Topeka

Starting off the afternoon and evening of April 26 with a golf party, the meeting of the Kansas Telephone Association at Topeka held sessions on April 27-28. A well rounded program with several features was prepared by officials working with secretary H. B. Couch and reports indicate this 1938 meeting to be the best of the past few years. Particular attention was called to the exhibits of the various suppliers to the industry and their assistance in making the convention most interesting. Of especial interest was the discussion by 20 Kansas telephone men who gave short talks on the subject "Business Conditions."

President Samuel Tucker, Pleasanton, in his address discussed the FCC and its draft on a uniform system of accourts for Class C companies, and the most popular subject, the effect of inductive interference by REA projects.

Officers for the coming year are; Mr. Tucker, president; Walter Pedigo, Pratt, vice president; Estella Henderson, Pleasanton, treasurer; and Mr. Couch, Topeka, secretary.

Ohio Elects J. T. Carliss

Holding its annual meeting at Columbus on May 2, 3 and 4, the Ohio Independent Telephone Association was treated to many addresses, one by its retiring president Col. Gustav Hirsch that rung the bell as a fitting climax to his two year reign as the head of that organization. His dissertation on the value of an association to its members will long be remembered because of its irrefutable proof in dollar and cents value to its members. His words on tax problems were to the point and will be used by many other associations in future years so clear was their import.

Convening with its largest attendance in recent years, little time was lost in presenting a program well selected for its diversity. Conferences were well attended and the manufacturers and suppliers overdid themselves in exhibits of interest. Holding a three day meeting this year, the last day was entirely used for conferences. Having Governor Davey as guest at the banquet the evening of May 4 was an added pleasure to the gayety of the evening and the following dancing enjoyed by everyone in attendance.

In his report, Secretary Frank L. McKinney gave interesting figures to prove the value of association activities in governmental, legislative and tax matters. L. M. Berry, Dayton, president of the Independent Pioneers, also spoke briefly. Reports from all sources are unanimous in praise of the 1938 Convention, its accomplishments, and the very enjoyable entertainment provided.

Officials selected were J. T. Carliss, Marion, president; J. W. Safford, Troy, vice president; Frank L. McKinney, Columbus, secretary-treasurer. All directors whose terms expired this year were re-elected.

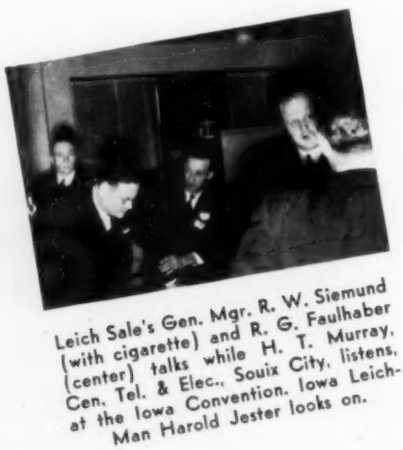
Indiana Hears Louis Pitcher

Taxation and regulation burdens on the telephone industry have become almost insupportable, declared Louis Pitcher, executive vice president of the United States Telephone Association, in addressing the nineteenth annual convention of the Indiana Telephone Association at Indianapolis, May 11-12. The very lives of some five thousand telephone companies in smaller communities, which cannot afford big payrolls and heavy taxes, are threatened, said the speaker. He averred that the National Labor Relations Board had always taken the side of the employee against the employer, making the continued operations of small organizations very precarious.

Progress in Indiana telephone use is indicated by the fact that there are now 515,928 connected stations with an average of six calls per instrument and a total daily average of 3,097,000. Indiana subscribers make 1,130,405,000 calls a year, or about 340 calls for every man, woman and child. Toll calls average 45,952 a day.

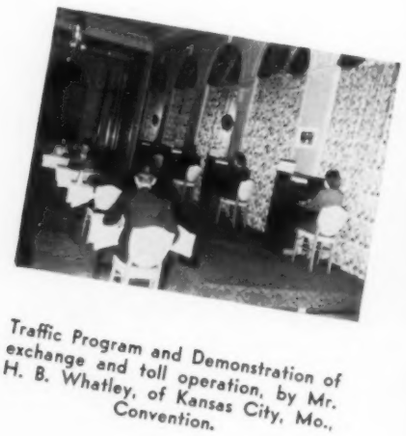
All officers of the association were re-elected. They are Frank E. Bohn, Ft. Wayne, now starting his fourth term as president; R. V. Achatz, Aurora, first vice president; J. G. H. Klingler, Brazil, second vice president; W. H. Beck, Indianapolis, secretary-treasurer. Directors chosen were Mr. Achatz; George Watts, Knightstown; H. F. Ehinger, Decatur; W. J. Scheidler, Greensburg; F. O. Cuppy, Lafayette. W. H. Van Horn, Logansport, was elected to fill the unexpired term as director of W. J. Uhl of that city.

Frank E. Bohn was most enthusiastic over accomplishments of the association during its past year. Other speakers included R. C. Reno, former editor of TELEPHONE ENGINEER.



Leich Sale's Gen. Mgr. R. W. Siemund (with cigarette) and R. G. Faulhaber (center) talks while H. T. Murray, Cen. Tel. & Elec., Souix City, listens, at the Iowa Convention. Iowa Leich-Man Harold Jester looks on.

Louis Pitcher and Automatic Electric's Burfeind at the Iowa Convention.



Traffic Program and Demonstration of exchange and toll operation, by Mr. H. B. Whatley, of Kansas City, Mo., Convention.

"Tapping In" On Washington

(Continued from page 18)

tem and the National Association of Railroad and Utilities Commissioners.

● The American Telephone and Telegraph Co. in presenting the case for the telephone industry during the hearing on the Mackay Radio circuit case before the full Commission emphasized that there were thousands of long distance telephone message circuits established daily over new routes through Bell System companies and over the lines of Independent companies and that there were many hundreds annually of special circuits for telephone toll traffic, teletypewriter and private lines service established for varying periods, some brief holiday times and others for seasonal periods. If the FCC decided to pass upon these circuits, it would not only result in a very heavy expense for the telephone companies but would mean a large increase in the FCC personnel to pass upon such circuits, the A. T. & T. spokesmen told the FCC.

FCC Studies Uniform Accounting System For Class C Companies

A plan, fostered by a number of state commissions and the FCC, to institute a uniform system of accounts for Class C telephone companies was discussed at a recent informal conference at the Communications Commission in which accounting experts of the Independent industry and the Federal and State Commissions participated. Another conference which will be projected to iron out unworkable and impractical features of the proposed system and to make the accounting requirements less burdensome as possible for the small telephone carriers is scheduled to be held in June at the FCC.

One position of the Independent industry appeared to have met the approval of the FCC and state commissions as a result of the recent study of the proposed accounting system. That was to raise the level of minimum annual revenues of companies subject to the FCC system from $10,000 a year to $25,000 a year. The original draft of the FCC system had placed the minimum level at $10,000 a year. One phase of the proposed accounting system which met considerable opposition from the Independent industry was that drop and block wire should be amortized through depreciation rather than under the present method of being chargeable to expenses, while another provision was that

(Please turn to page 39)

Much has been said about the desirability of lower prices in the economic structure. It has always seemed to me that the Western Electric-Bell System relationship offers one interesting solution of this problem.

PRESIDENT

In the Public Interest

If a business did not need to seek or promote its market,

If its customers were fellow members in the same corporate system,

If their orders were consolidated so that economical production could be achieved,

Then—manufacturing could be conducted most efficiently and sales made without selling expense and without credit loss.

That exactly describes Western Electric's position in the Bell System, and the economies resulting from this arrangement are passed along to the telephone companies in the form of lower prices.

Thus Western Electric contributes its part in making Bell telephone service economical, and justifies its place in the Bell System as in the public interest.

Western Electric

BELL SYSTEM SERVICE
IS BASED ON
WESTERN ELECTRIC QUALITY

LINE and DESK

RAY BLAIN, Member A. I. E. E., Editor

Q. What is tree wire and for what purpose is it used?

A. It is a well insulated wire used on open leads where proper tree clearance cannot be obtained. The tree wire should be run for the full span and spliced to the bare wire about two feet beyond the crossarm. The tree wire may be fastened to insulators with either bare or insulated tie wires.

Q. How can one determine the side of an insulator on which the wire should be tied?

A. On a straight line the wires should be tied on the pole side of the insulator except the pole pins which should be tied on the outside to provide adequate climbing space. On corners place the wires so that they will pull against the insulators and not the tie wires.

Q. We have a large number of defective transmitters and would appreciate detailed instructions as to how they may be repaired locally?

A. We would not recommend the local repair of transmitters. This is a most difficult task when suitable testing equipment is not available and the results may not be uniform. We suggest you return your defective transmitters either to the manufacturer or some well equipped telephone repair shop that specializes in the rebuilding and repair of transmitters.

Q. Where should the gain be located on a crooked pole?

A. Ordinarily the gain should be cut on the inside of the sweep. A good way to make sure this is properly done is to place the top of the pole in a jenny or on a saw horse with the butt on the ground and the heavy side of the pole will work down to the bottom. The gain should then be cut on top.

Q. How can house wire be attached to baseboards when the use of milonite nails are not considered desirable?

A. In this case we would recommend the use of fibre insulators. These insulators consist of a round headed nail, reinforcing a top fibre disc. The twisted wire loop is placed between the disc and the nail driven into the wood. The rubber bulges, giving a thick insulation and the wires are clamped between the discs.

Q. How can wires be deadened in each direction on a crossarm for a test station without using double groove insulators?

A. We would recommend the use of the standard break irons. This is a piece of heavy iron about 6" long drilled to hold a standard steel pin and insulator in each end. A hole in the center clamps it in the regular pin hole in the crossarm. This provides a neat and efficient test station.

Q. When we pull cable out of underground conduit we find it almost impossible to avoid damage to the lead sheath. Do you have anything to suggest which might be of help to us?

A. If a manhole skid is used to pull the cable over to clear the manhole it should be equipped with large rollers to avoid bending the sheath too sharply. These big rollers 10 to 12 inches in diameter also reduce the pull on the cable necessary for its removal. Large pulleys should also be used instead of the usual snatch block in all cable pulling. A split laced cable grip should be used to attach the pulling line to the cable. Short pulls should be taken until the cable gets started well.

Q. We have a teletype printer connected through our telephone cable and would like to know whether there is any danger of either the voltage or the current causing trouble to this cable?

A. The connecting of printers of this type through telephone cable is a common practice and there is no danger of causing trouble if the current and voltage is held down to safe limits. Most telephone companies specify that the voltage must be held down to 130 volts positive or negative on each side of the pair to ground. The current is also generally held down to about 70 milliamperes. Higher voltages and currents would probably have no detrimental effects to the cable but would do doubt cause noise on the talking pairs connected through the same cable.

Q. We are experiencing considerable trouble with our blow torches and plumbers furnaces. Not only do we have difficulty keeping them burning but they do not heat well.

A. We are of the opinion that you are attempting to use the so called, premium, or treated gasoline. Nothing except white gasoline should ever be used in blow torches and plumbers furances. If you have been using premium gasoline it will probably be necessary to thoroughly clean the torches and purchase new generator coils for the plumbers furances.

Q. What is the greatest length of pole which may be erected with a regulation type pole derrick on a line construction?

A. The average manufacturer makes no claims for their regular type derrick handling a pole longer than 55 ft. though we have often set 60 footers with ours. It is sometimes necessary to raise the pole to its maximum height of the derrick with the butt over the hole and then move the truck, either forward or backward until the pole slides into the hole. When using this method it may be necessary to trench one side of the hole slightly.

Q. We have a 3-position manual switchboard, equipped with 500 subscribers lines. This is a four panel multiple and the two end operators have difficulty reaching all numbers. We propose the installation of a three panel multiple and would appreciate your ideas in the matter.

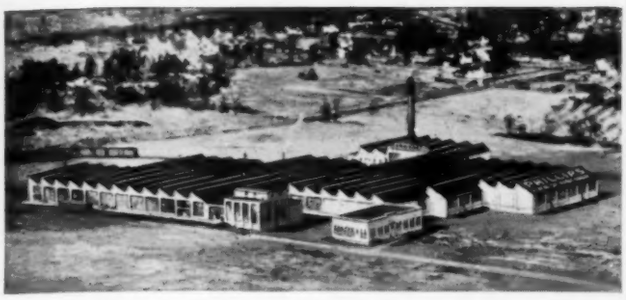
A. Personally we prefer the four panel multiple on a switchboard of this size and type. We suggest that a dummy panel be installed on each end of the switchboard which will make it possible for each operator to reach all numbers on the four panels nearest her position. That is, the two panels on her position and one on either side. This arrangement gives all the face equipment advantages of a four position switchboard at a much lower cost.

Q. What type dry cell operated flashlight do you consider most desirable for the use of telephone trouble-men?

A. We prefer the waterproof variety every time. These are covered with a soft rubber sleeve, switch and all. The lenses are unbreakable and the reflectors are chrome plated. This type flashlight costs a little more at the start but due to their long life and superior performance will, we believe, prove a good investment.

Q. What is the weight and capacity of a large winch, suitable for use on a telephone line construction truck?

A. This will vary somewhat with the type selected and the purpose for which it is designed. One large winch weighs 575 lbs. and has a pulling capacity of 10,000 lbs. under constant load on the first layer of line on drum and with 15,000 lbs. intermittant pulling capacity.



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WIRES AND CABLES OF HIGHEST QUALITY

With one of the most modern and comprehensive plants for wire and cable fabrication in the world, the experienced PHILLIPS organization can supply every requirement for telephone, telegraph and power work.

For almost half a century, PHILLIPS wire and cable products have been noted for undeviating high quality. Year in and year out, through the heat of summer and storms of winter, they can always be relied upon to deliver the utmost in unfailing performance and reliable operation.

Write for prices and technical data on PHILLIPS wires and cables—full information sent promptly upon request.

PHILLIPS Products Also Include:

A complete range of telephone instruments, telephone switching equipment for public and private exchanges, and telephone protective apparatus.

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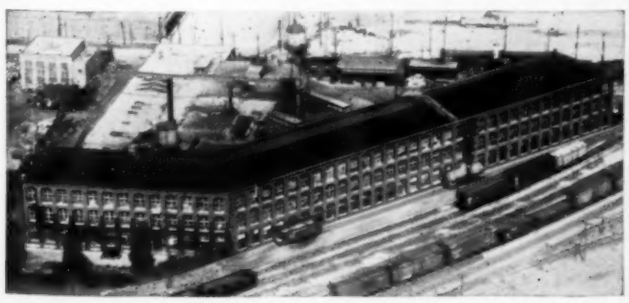
Distributors for Canada:
CANADIAN TELEPHONES & SUPPLIES LIMITED
284 King Street West, Toronto
WINNIPEG MONTREAL REGINA BROCKVILLE VANCOUVER



THE PHILLIPS CABLE PLANT AT MONTREAL, QUEBEC

One step ahead!

Whitney-Blake telephone wires are made to specifications that are always a step ahead of current telephone requirements.

Because of their finer materials, greater tensile strength and long-lasting qualities. "WB" wires are the choice of those who buy their wire by the year, not by the foot. Available in all types of conductors from the distributor, Graybar.

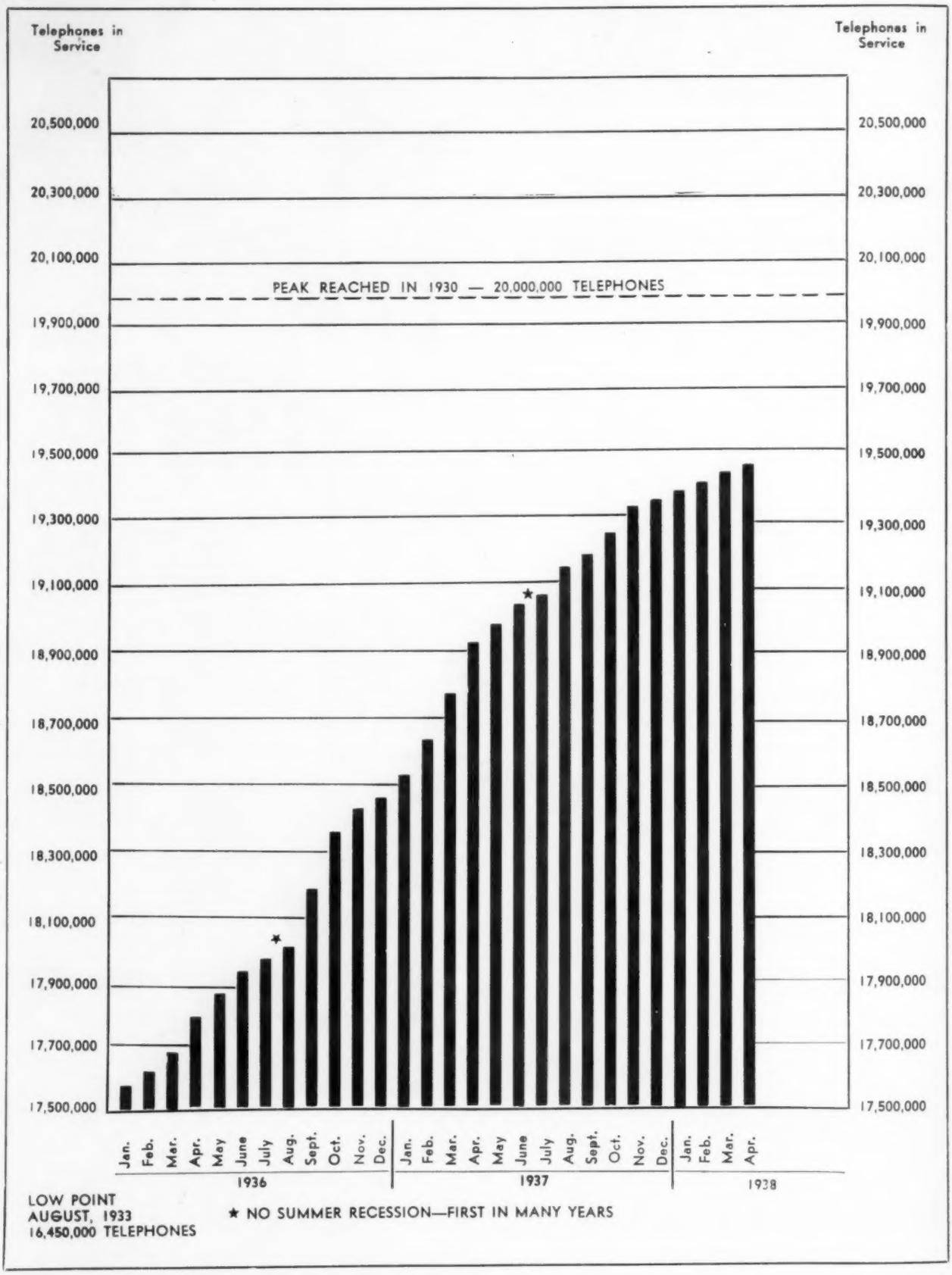
WHITNEY-BLAKE TELEPHONE WIRE

distributed by

Graybar

OFFICES IN 85 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BLDG., N.Y.

Monthly Telephone Station Barometer



Air Conditioning For Exchanges

(Continued from page 20)

Compact Design Combination and Surface Dehumidifiers Fig. 4 shows a factory built combination spray and surface dehumidifier. The recirculating pump shown at the lower left hand side of the picture is used to spray a small quantity of water over the face of the coil. Coils may be obtained for use of water or direct expansion. One of the features is that several sizes of units may be selected for use singly or in combination to give a range of dehumidifier capacities from 4000 to about 32000 CFM.

Evaporative Condensers In localities where water supply is limited in quantity or pressure, or is expensive, some type of air cooled condenser is highly desirable. One type (see Fig. 5) utilizes the evaporative cooling effect of water sprayed over the coils in which the refrigerant gas is condensed. Operating advantages are: 90% to 95% less water used (compared with water cooled condensers); saving in power due to elimination of one heat transfer temperature differential*; increased compressor capacity (allowing, in some cases, use of smaller compressor); makes possible larger installations in water scarce localities; practical elimination of pumping cost (compared with cooling tower installations); and lower operating costs thru effective use of outside wet bulb temperatures.

Self Contained Units For the smaller installations, especially where comfort is the principal requirement, a self-contained completely factory assembled unit (see Fig. 6) may be applied. Such units are generally suitable for ventilating, cooling, dehumidifying, filtering and circulating the air in a single room. The condenser heat and excess moisture condensed out of the air are exhausted to the outdoors. Air for ventilation must be available to the unit inlet. Control is of an "on and off" nature as no provision is made for varying the compressor capacity for portial load conditions.

These units at the present time, therefore, have a limited use in telephone switchrooms and equipment rooms where year round control of temperature and humidity is desirable.

*This advantage may need a little explanation: if the refrigerant is condensed in a water cooled condenser and the condenser water then cooled by use of a cooling tower, there must be a temperature difference between the refrigerant and the water temperature in the condenser and also a temperature difference between the outside wet bulb and the water temperature. For an evaporative condenser the heat is transferred directly from the refrigerant to the outside air, thus eliminating one temperature head.

Owning and Operating Costs

Unfortunately, or fortunately, as the case may be, all telephone buildings are not constructed from the same set of plans. Variation in location, construction, exposure, size and internal loadings all affect the cost of air conditioning systems. Unit prices based on square feet of floor area, cubic feet of air supplied, or tons of refrigeration required, are very unreliable. Accurate cost estimates, as for any other engineering project, require infinite detail including, for example, consideration of: the most economical type and size of air conditioning plant for a given room, department or building; nature and magnitude of the cooling and heating loads, effect of solar radiation and exposure; location of apparatus with respect to the conditioned space; problems in air distribution caused by the requirement of avoiding interference with telephone equipment; condensing means, whether cooling towers or evaporative condensers are to be used; economic use of well water, if available; and the refinements required of automatic control systems.

Despite this imposing array of variables the question telephone engineers want answered is, "How much will it cost?" A partial answer is to cite the fact that the earlier installations cost between $2 and $3 per square foot of net conditioned

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NOTHING TO ADJUST
NO RADIO INTERFERENCE

SIMPLE
POWERFUL
TROUBLEFREE

THERE IS NOW A SUB-CYCLE FOR EVERY PURPOSE

Model "S" — Output 20 watts 90 volts.....Price 45.00
(Size — 11½x8x5¼. Finish — Black Wrinkle Lacquer)

Model "B"—Output 15/20 watts 90 volts.....Price 52.75
(Size — 14x9½x5½. Finish — Aluminum Lacquer)

Model "C"—Output 40/50 watts 90 volts and 130 volts....Price 93.50
(Size—15x11x5½. Finish—Black Wrinkle Lacquer)

Model "S/P"—Same as "S" but includes Pulsator.....Price 55.00
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Operates on 105-125 volts A. C.
30 DAY'S FREE TRIAL
PERFECT RINGING SERVICE

LORAIN PRODUCTS CORP. LORAIN, OHIO

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Reliable

PROTECTED CABLE TERMINALS

The all metal B-27 is modern and outstanding in design with added assurance of long "terminal life."

Made in three types for three standard cable terminal fuses. Upon request we will send a sample for your inspection without charge.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
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area; gradual reductions were effected as equipment was improved and larger volumes were encountered until at the present time $.60 per square foot may be considered low, $1.00 to $1.50 per square foot as average, and $2.00 per square foot as high. These are average figures for material and labor for air conditioning equipment only and costs of building construction changes, furring, electrical wiring, plumbing connections and steam supply and return connections must be added. These usually average from 10% to 15% of the above costs.

After the system is purchased and installed, how much will it cost to operate? This, also, is an indeterminate question because of variables introduced by outside weather conditions, internal cooling and heating loads, condensing means, etc. The best manner in which to determine operating costs is to install power and water meters and keep an accurate operating log. Experience has shown that the annual operating costs, including maintenance and labor, may vary from $.12 to $.20 per square foot of net conditioned erea for twenty-four hour daily operation.

END

Purchase Telephone Group In Iowa

The Central Iowa Telephone company, with headquarters at Toledo, Iowa, has announced its purchase of the Iowa Union Telephone company including 13 exchanges in Northwest Iowa and southern Minnesota. The Emmetsburg offices, headquarters for the Iowa Union firm, are among the exchanges affected. Other exchanges bought by the Central company are: Rolfe, Hartley, Swea City, Forest City, St. Ansgar and Klemme, all in Iowa, and Lyle, Leroy, Adams, Kiester, Alden and Sanborn, all of Minnesota.

Safety Bulletin

Isn't it true that one is more likely to believe a certain story that has been told to him by two different persons, than he is to believe the same story told him twice by the same person.

The point is this: The usual direct-poster method, employed by telephone companies, involve the posting on bulletin boards of a series of safety messages, telling the story of safe practices each time, phrased, however, in a little different language, and perhaps cloaked in a little different type of colorful appeal, thereby illustrating the value of using posters to present safety ideas.

"They're heads of the Phone Co. talking things over."

"Tapping In" On Washington

(Continued from page 33)

a number of telephone income and expense items should be placed in surplus accounts which would be set up as sort of a "basket" or catch-all for these items. The Independent industry was represented at this conference by Ranford Dunlap of the Home Telephone and Telegraph Co. of Fort Wayne, Ind., chairman of the U. S. Independent Telephone Association accounting committee, C. D. D'Aoust of the Commonwealth Telephone Co. of Madison, Wis., and I. J. Devoe of the Lincoln, (Nebr.), Telephone and Telegraph Co.

FCC Denies 15 Per Cent Telephone Rate Increase

THE denial by a 5 to 2 vote of the telegraph industry's petition for an increase of domestic telegraph rates by 15 per cent showed that the Federal Communications Commission will not subscribe the theory of higher rates during a business depression to make up for reduced revenues.

The decision of the FCC also illustrated another interesting point that the Federal Commission majority—Commissioners Craven and Case were the only two members to vote for an increase on a temporary one-year basis—was willing to incline its ear very closely to the views of state commissioners. Five state commissioners participated in the telegraph rate increase hearings under the cooperative procedure of the Communications Act and, while the state commissioners had no vote, it is known that they unanimously expressed their opinions to the FCC that the rate increase should be rejected.

● Another point of interest in the decision was that the majority, which was composed of Chairman McNinch, Commissioners Sykes, Brown, Walker and Payne, based their decision upon a philosophy of prudent investment that the present allegedly excessive plant of the telegraph companies, which had been built before the 1929 depression with a view towards future expansion of traffic and for greater national coverage, should not be considered as a part of the rate base in the determination of fair charges for telegraph service. The two dissenting Commissioners followed the views that the management of the telegraph companies knew the needs of their industry and had presented the request of a rate increase—the first in 30 years—because of the financial emergency which their companies faced. In taking this position, the two FCC Commissioners followed the line of reasoning of Interstate Commerce Commissioner Joseph Eastman, regarded as one of the ablest experts in government regulation, in his dissent on the ICC's rejection of a railroad passenger rate increase.

Miscellaneous Briefs

THE FCC is rapidly cleaning up its inquiry into the alleged financial control by Bell System companies over Independent Telephone companies. Recently after hearings and examiner's reports it decided that the Tri-County Telephone Co. of South Haven, Mich., and the Santa Barbara, Cal., Telephone Company were Independent companies which only connected for interstate telephone service physically with the Bell System. Another interesting case, which is pending after an examiner had held the companies were fully subject to the FCC, involved the control of the Norfolk and Carolina Telephone Companies of Elizabeth City, N. C., and of Virginia. The examiner recommended the full FCC regulation because the same family owned the majority of stock in each company, but Alfred L. Geiger, general attorney of the U. S. Independent Telephone Association, has contested this position by citing that family control does not constitute legal control. The recent treatise in the Harvard University Law School Review on interstate telephone regulation by Carl I. Wheat, FCC Telephone Rate Counsel, is being published as a Senate Document. Senator Bone of Washington, leading member of the Senate Interstate Commerce Committee, secured approval by a unanimous Senate vote of the publication of the article as an official Senate document. Mr. Wheat in his article stressed that regulation should be placed on a sound factual basis with full research into all phases of the regulatory problems and that negotiation rather than long-drawn-out controversy and litigation should guide regulatory bodies in their dealings with the telephone companies.

"Horrible State" of Akono Subusu

"This letter was sent to Mr. Symonds, District Officer in a Native Territory, by one of the "educated" Native (coal black) Clerks, Mr. Symonds had sacked for sleeping on duty. As is usually the case with the African Negro, Akono Subusu's choice of words, and attempted flowery use of the English language makes amusing reading for the white man."

Mr. F. Symonds,
District Officer,
ABCOKUTA.

Kind sir, on opening this epistle, you will behold the work of a dejobbed person, and a very bewifed and much childrenised gentleman, who was violently dejobbed in a twinkling by your goodself. For Heaven's sake, sir, consider this catastrophe as falling on your own head, and remind yourself on walking home at the Moon's end to five savage wives and sixteen voracious children with your pockets filled with non-existent £.S.D. and a solitary sixpence, pity my horrible state. When being dejobbed, and proceeding with a heart and intestines filled with misery in this den of doom, myself did greedily contemplate culpable homicide, but Him who protected Daniel (poet) safe through the Lion's Den, will protect His servant in his home of evil. As to reason given by yourself esquire for my dejobment, the incrimination was laziness.

NO SIR. It were impossible that myself who has pitched sixteen infant children into this vale of tears can have a lazy atom in his mortal frame, and a sudden departure of eleven (£) pounds has left me on the verge of the abyss of destitution and despair.

I hope this vision of horror will enrich your dreams this night, and good Angel will meet and pulverise your heart of nether milestone, so that you will awaken, and with such alacrity as may be compatible with your personal safety, will hasten to rejobulate your servant.

So note it be, Amen.

Yours despairfully,
AKONO SUBUSU.

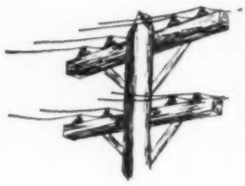
NOTE BY DISTRICT OFFICER:

Gentle Reader do not sob,
Akono Subusu has been rejobbed.

—*Anonymous.*

LONG LINES

R. A. Clark, Jr.



Balancing Telephone Repeater

THE successful operation of telephone repeaters is dependent wholly on a close balance between the lines on each side of the repeater and their associated balancing networks. The theory of telephone repeaters has been presented in previous articles in TELEPHONE ENGINEER (Telephone Transmission articles, Chapter XI December, 1936. The measure of balance between a telephone line and its network is expressed in db singing point. The singing point represents the transmission loss from the output side of the hybrid coil to its associated input side. Under perfect balance conditions i.e. when the network exactly simulates the line the transmission loss from the output terminals of the hybrid coils to the associated input terminals is exceedingly high. Under practical line conditions, singing points from 10 to 25 db can be obtained. Where there are irregularities such as nonloaded cable in open wire lines or bridged telephones the singing point may drop as low as 5 db.

● The singing point definitely limits the gain at which the repeater may be operated. In general, on circuits containing two or three repeaters the sum of the gains of the repeater in each direction should be less than the sum of the singing points by at least 6 db. Where more repeaters are used somewhat greater margins should be maintained.

A convenient means for measuring singing points in known as the reflection attenuator method and shown in Figure 1. Assume we desire to measure the singing point of the West network versus the West line. A 600 ohm resistor is connected to the East network and a variable resistance to the East line terminals. The repeater is adjusted to have nominal gain in each direction, for example, say 15 db. The variable resistance is adjusted until the repeater just starts to sing. The value of the variable resistance at this point is then noted. The procedure is repeated except that the variable resistance is connected to the East network terminals and the 600 ohms to the East line terminals. A slightly different value of resistance will probably be observed. Choosing the lowest of the two values, the singing point of the resistance combination is obtained from Table 1. The singing point of the line is then equal to the sum of the repeater gains which in our example would be 30 db less the singing point of the resistance networks. Suppose we observed a value of 315 ohms in the variable resistance at the point the repeater started to sing. From Table 1 we find that this is equivalent to a singing point of 10 db. The singing point of the line and its associated network is therefore 30 db less 10 db or 20 db.

● A convenient test unit for measuring singing points is shown in Figure 2. This consists of a 600 ohm resistor connected to two terminals and a jack. A 0—600 ohm variable resistor calibrated to read direct in db is also mounted in the unit. The calibration follows the value shown in Table 1. With such a device it is merely necessary to connect the 600 ohm

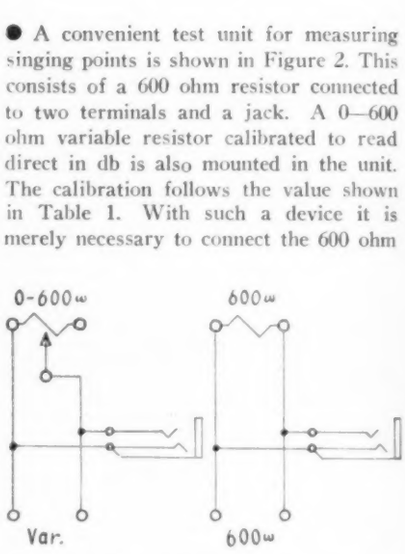


Fig. 2—Circuit Diagram of Test Unit for Measuring Singing Point

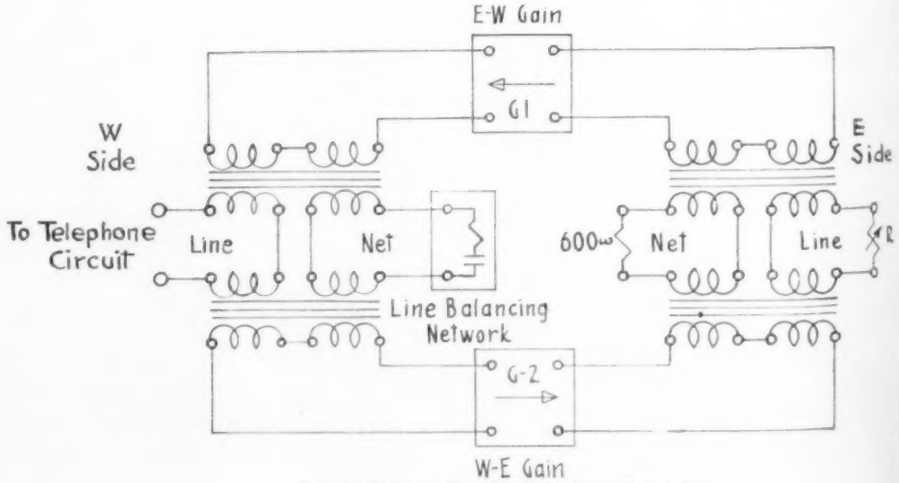


Fig. 1—Balance Test for Telephone Repeater

TABLE 1.

Singing Point of Resistance

VS 600 Ohms.

Singing Point DB	Resistance Ohms.
0	0
2	68
4	135
6	200
8	260
10	315
12	360
14	400
16	435
18	465
20	490
22	510
24	525
26	540
28	550
30	560

and the variable resistor to the repeater and knowing the repeater gains obtain the singing point directly.

It is good practice to make routine singing point measurements at all repeater points at least once a month. Line conditions will change from time to time and unless a careful check is made at frequent intervals the singing points may drop materially unless small irregularities are located and connected.

Interesting Booklet

Following a series of radio broadcasts in which C. C. Deering, Secretary of the Iowa Independent Telephone Association was the motivating spirit, a very interesting eight page booklet was prepared and has been mailed to members of that association.

The broadcast held over station WOI at Ames, Iowa was put on the air January 31st, February 7th, and February 14th. The booklet gives the substance of these talks which proves very interesting reading or listening to the public anywhere. The broadcast plan was a great success, and we understand other associations are contemplating like broadcasts.

Discussion on rural electrification is unusually interesting and deserves close attention by all telephone companies who are now, or will be, bothered by inductive interference.

John W. Marder Dies

John W. Marder, one-time general manager of the Stromberg-Carlson Telephone Mfg. Co., died in a hospital at Rochester, N. Y., on April 19th. He was vice-president and director of the Society of Industrial Engineers in 1932 and 1933, and at his death was a national director of the Society for the Advancement of Management.

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Local Test Desk Operation

(Continued from page 27)

Assuming the line circuit to be 20 miles long then the distance to the cross from the testing point is to the effect that 330 ohms is to 20 miles, as 280.5 ohms is to 16 miles, or 330:20::280.5:X or 330xX=20x 280.5, therefore X=20x 280.5/330=16 miles to the cross.

Occasionally it is desired to obtain the resistance of a terminal ground connection. First the resistance of the two line conductors to earth through the ground connection is measured. Then the two line wires are looped together at the point of contact with the ground and their resistance measured. Next, the resistance of the two line wires as measured separately are added together, and compared with the resistance of the loop.

If the resistance of the sum of the two is greater than that of the loop, the ground connection is faulty, and it's resistance is found by deducting the resistance of the loop from that of the sum of the two line wires separate resistance measurements, and dividing the remainder by 2.

● To find the individual resistance of several wires arrange bridge set up in which A, B, and C will be the resistance of line wires 1, 2 and 3. Make three loop resistance measurements as shown in figure 3, then R1 will equal

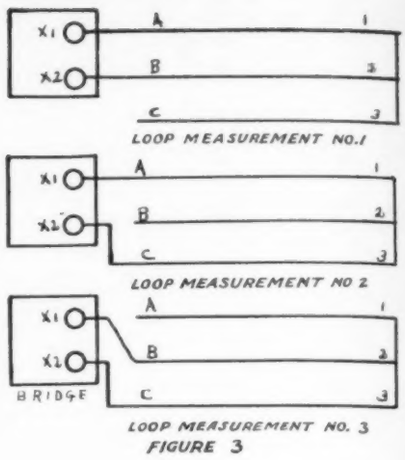

FIGURE 3

the loop resistance of wires A and B, R2 the resistance of wires A and C, and R3 the resistance of wires B and C and etc.

Then C=R2+R3—R1/2
B=R1+R3—R2/2
A=R1+R2—R3/2

Example: A to B equal R1 or 200 ohms, A to C equals R2 or 195 ohms, and B to C equals R3 or 205 ohms, then the resistance of wire "C" is 195+205=400 —200/2 100 ohms. The resistance of wire "B" is equal to 200+205=405 —195/2=105 ohms and wire "A" is 200+195=395—205=190/2=95 ohms.

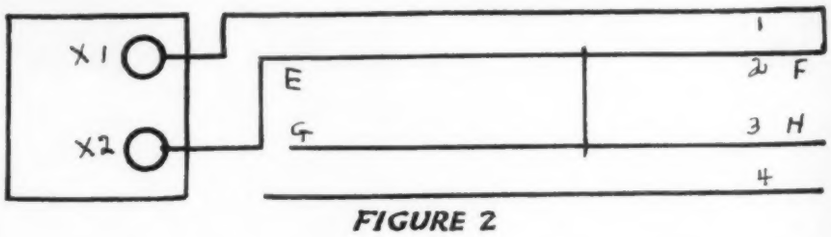

FIGURE 2

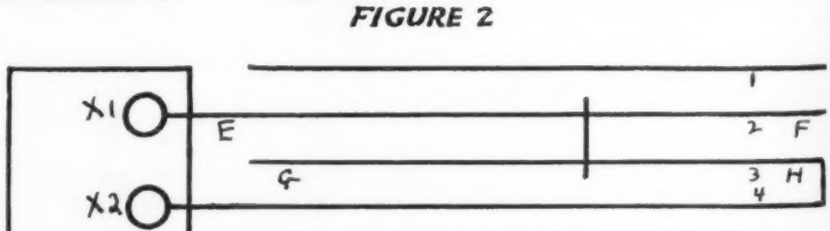

FIGURE 2A

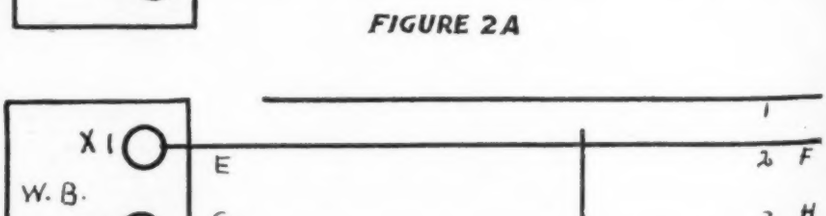

FIGURE 2B

NOTE: The resistance of wires No. 1 and No. 4 is known and subtracted from the bridge readings of figures 2 and 2a measurements.

Reverting Calls In Automatic Exchanges

(Continued from page 30)

code selector release magnets is closed; both are restored to normal by spring action.

When the short circuit around springs 3/4 of relay G is omitted, this switch is released as soon as the called party answers. This wiring is used in systems having lock-out line circuits and a line relay suitable for battery feed.

If we consider a call from station 7 to station 5 (two stations connected to different sides of the line) the wipers of code selector 1 are on contacts 7 and the wipers of code selector 2 on contacts 5; both stations are rung simultaneously over the two sides of the line as follows:

Ringing current (code 5) is sent over the negative side of the line as described previously (through the secondary winding of the repeating coil). Ground connected ringing current (code 2), the code of the calling station is sent over the positive side of the line by a circuit through the bottom bank of code selector 1 through the bottom bank of code selector 2, through relay G to the positive line. The ringing circuit is closed through the ringers to ground. The ground on the top wiper of code selector 1 is an open circuit and ineffective.

The tripping circuit and other operations when the called party answers are the same as previously described.

The reverting call switch circuit for ten-party full selective harmonic ringing is similar to this circuit, except that ringing current to signal the calling and the called station is not sent simultaneously, but alternately, controled by a common interrupter as shown in Fig. 2.

It will be noted that the reverting call switch circuits are ringing "back" over the same path over which the call has been set up. Hence there can be no battery feed relays or other D. C. bridges across the line in any switch back of the reverting call switch. The standard Strowger switch train as used in the United States is arranged for this feature. It differs in this respect from some of the Strowger systems used in Europe where the battery feed relay for the calling party is usually in the first selector.

Directory Number Method

Illustration 4 shows, in a schematic form, the circuit elements for a reverting call service using the regular directory number. This illustration shows part of a standard connector circuit as well as a typical three-relay line circuit of the lock-out type.

The connector shows only such relays and such contacts as are necessary for the description of the reverting call operation. Relay A is the pulsing relay, B the release relay, D the back bridge, F the ringing trip relay, G the busy test relay, and H the switching-through and test relay. The functions of these relays are well known and need no further description. This circuit shows three additional relays which are provided for the purposes of reverting call service; RC the reverting call relay, B1 auxiliary release relay, and G1, an auxiliary to the busy test relay.

When a reverting call is made, the connector is extended to the same line as the line finder. When dialing is completed, the relays operated are A, B, B1, and G of the connector, and CO and LO of the line circuit. G places the busy tone on the calling line. The calling party hangs up upon receiving the busy signal. As soon as he hangs up, relay A releases and closes the circuit of G1. G1 grounds the C-conductor of the called terminal which connects ground to the C-lead of the line circuit before ground is removed by relay B. Relay B is slow releasing and will remain operated a short time after A releases. When B releases, relays CO and LO of the line circuit and relay B1 remain operated from the ground placed on the C-conductor by relay G1. The release of relay B extends this ground to relay RC which operates and locks itself to

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the same ground. RC removes relay A from the line and closes the circuit of relay H. H operates, locks itself and also places ground on the C-conductor of the called terminal. The operation of relay H opens the circuit of the busy relay G which in turn also releases relay G1.

The relays now operated are RC, B1 and H. This places ringing current on the called line. As this circuit is normally used in a party-line connector, it should be assumed that the particular ringing code or frequency placed on the line has previously been selected in the connector by the usual means which are not shown.

When the receiver is removed at the called station, relay F is operated and connects relay D to the line. D opens the circuit of B1. B1, in releasing, closes the release circuit which releases the line finder and connector thereby removing ground from the line circuit as soon as the C-lead of the connector is disconnected from the respective connector terminal.

When ground is removed, relay CO will release, but relay L of the line circuit will operate over the closed loop. Relay LO which is slow releasing is kept operated by ground thru springs 6/7 of relay L. Relay LO keeps the finder start circuit open so that no finder will be started to search for this line. Battery is supplied to both parties thru relay L. When both parties hang up, relays L and LO restore to normal.

It is obvious that only a slight change is required in this circuit to keep the connector in its operated position and supply talking battery from relay D if no lock-out line circuit is provided.

While this simplified circuit shows three additional relays required for the reverting call feature, not more than two additional relays are actually required as at least one of these relays can be combined with some other relay of the connector circuit. This circuit is a very positive circuit without critical limits as the condition indicating a reverting call cannot be duplicated by any other combination of conditions.

Other reverting call circuits for directory numbers use a fourth wire between the connector and the line finder, or a time criterion; in the latter case, a reverting call is recognized when the ground on the calling line is removed simultaneously with the ground on the called line (which is the normal condition at the moment the calling party hangs up while making a reverting call).

With the "directory number method" which makes use of the regular connector, the called station is rung in exactly the same manner as on a regular call; generator is not sent "back" but "forward." Hence it is immaterial whether there are any bridges back of the connector; from the point of view of systems design, this facilitates circuit design.

Ringing with hand generator

Figure 5 shows a special line adapter circuit for a local battery full automatic line. This circuit is designed for very long rural lines arranged for simplex dialing and provides the following features:

A. It repeats simplex to loop pulses.
B. On calls to the line, the repeating coil is bi-passed so that generator is placed directly on the line.
C. Reverting calls are made by ringing on the line with a hand generator in the stations. This is accompanied in the following manner:

The A.C. relay J has two windings which on regular calls are opposing each other so that relay J will not operate on a reverting call, the two windings of relay J are in series. when the d.c. circuit of relay A is closed. When the calling station operates the hand generator, relay J operates, grounds a common timer circuit and closes the circuit to relay B. The timer circuit connects ground to the "lock" lead and keeps ground on this lead for about 10 seconds so that relay B will remain operated during the ringing period and no matter whether J remains operated or not. Relay B opens the circuit to the regular line equipment so that the line finder will not be operated.

The calling party will ring the code of the called station; then removes his receiver. This will operate relay A. A closes the circuit to C as B is still operated. The operation of C will close a new holding circuit for relay B placing it under control of relay A and disconnecting it from the timer circuit. The adapter circuit therefore remains disconnected from the regular line equipment as long as the reverting call lasts, i.e. until the receivers are restored at both stations.

During a reverting call, a ground placed on the C-lead by relay B makes the line busy so that no other call can be extended to the line. If the called party does not answer the calling party can re-ring, repeating the operations previously described.

END

Developing India Rapidly

The Government is proceeding rapidly with its plans for the development of the long distance telephone service throughout British India. The installation of a carrier circuit between Delhi and Bombay, capable of transmitting simultaneously four telephone and four telegraph messages, is nearing completion. Similar multiplex circuits will also be constructed between Madras and Bombay and Karachi and Delhi-Calcutta.

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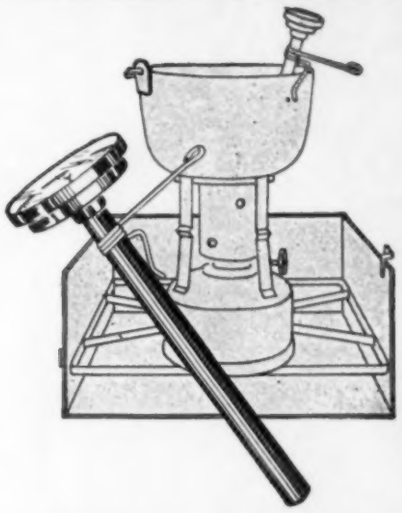

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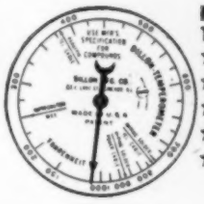

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Rambler Rambles Again

By J. A. SMITH

From "Where the West Begins"—Forth Worth, to the heart of the "effete east"—Boston, and then back thru other of the great eastern cities, was the experience of Rambler and his family during the past two months. During the sixty days Rambler made the usual jaunts to conventions in the southwest and the usual business trip east, and on both occasions was accompanied by the family.

▲

On this occasion a new member of the party made the trip—Mrs. E. A. Reach of Fort Worth, daughter of Mrs. Rambler. This being the first extended trip of Mrs. Daughter Rambler, new interest was added from day to day by the outbursts of amusement, amazement an remarks as beauty spots were passed enroute. Stops at Cleveland, Niagara, Rochester, Springfield, Mass., Boston and other greater cities in the east. Weekends were spent in Boston, New York and Pittsburgh.

▲

One of the incidents of the trip was the arrival in Niagara Falls a few minutes before the sinking of the last section of the International "honey moon" bridge spanning Niagara river; this spectacle was witnessed by the family. But enough of this family stuff.

▲

Lest our readers get the idea that Rambler is turning playboy we want to say here and now that the eastern trip was strictly business as far as Original Rambler was concerned. The female of the species accompanied the writer as an outing or vacation.

▲

While in Fort Worth announcement was made by a nut politician, who had the idea that he had the makings of a governor and aspired to that position, was a plank in his platform which he believed would forever settle future quarrels with Mexico over squabbles arising along the southern border of the United States. His idea was for the state of Texas to buy the border and then there would be nothing to fuss over. You figure that out!

▲

Manager H. M. Engh of the Pennsylvania Telephone Corporation, Erie, Pa., was called upon by Rambler on his trip across that Commonwealth in April, and a very pleasant half hour was spent in his spacious office. Business conditions were discussed and it was the feeling that the telephone industry was in about as good shape as any industry; possibly less depression is felt in this line than most others. Mr. Engh is enjoying excellent health.

▲

In his haste to go places, Rambler passed up the Wrights at Jamestown, N. Y., but he enjoyed a visit with both John H. and Lloyd at the Columbus, Ohio, convention, on our way home. It's always a pleasure to meet these progressive business men.

▲

The hand of death again passes over pioneer friends of Rambler. Walter Gallon, veteran telephone man and president of the Wisconsin Telephone Association for many years, passed to his reward during March. He was indeed a friend to those who knew him well. His demise is a loss to the industry and a distinct shock to the little city of Antigo, where he resided . . . From Texas comes the information that Hal Cox, formerly of Waco but later of Sherman, Texas, passed away during April. Hal was well known to the pioneers of the faith as far back as twenty five years. While not an old man by any means, his was an active life until a break in his health a few years ago forced him into retirement . . . Readers of Telephone Engineer will regret to learn of the death of the father of the former editor of this publication, Ralph C. Reno. Pete's father died during the month of April also. While not in the telephone business Mr. Reno will be remembered because of the many friends of his son.

▲

Strikes are so numerous in the east that they become a pest. Pickets are found in almost every business block in some of the cities. One of the most unusual that we ran across was in

Newark where the colored race was picketing a large dry goods store demanding that because of the large colored population in that city, colored help should be added in proportion to the population of their race. Courts are said to have upheld their contention.

▲

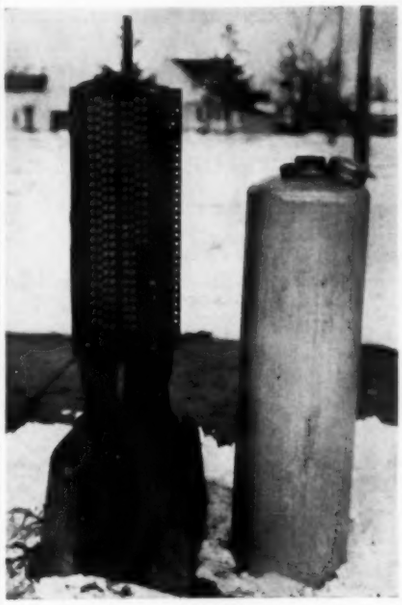
Early spring weather had its effect upon mother nature throughout the east as well as the south. As early as April 1st flowers and forest were budding and during the month blossoms were prevalent throughout the east. Pioneer Johnston of the Telephone Pioneers stated that late cold after warm weather had nipped some of the apples from his trees and he estimated that about one-third of a crop would result.

New Telephone Device Uses

A new device designed to eliminate the telephone pole and overhead transmission of wires and cables has been developed by the Northern Iowa Tele-

phone Company, Cresco, Iowa, and experimental installations are said to have revealed several worthwhile advantages.

The unit consists of a malleable iron standard to which panel board are attached, a maleable iron base which is fastened to a concrete foundation, and a protecting cylindrical cover. The cable enters the container from conduits or covered trenches, and the cable ends are attached to the insulator panel. From the panels individual or group cables are taken underground to residences or business buildings.



This type of construction leads to considerable time savings and a greater permanency for the terminal units. Malleable iron is used for the base and panel standard to give these parts resistance to shock and corrosion. Should the unit be struck in an accident, the standard and the base would withstand considerable distortion before breaking.

In assembly, each main cable termin-

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Drop forged tool steel. Rapid cutter Blade may be placed next to main limb of tree with hook handle held in LEFT hand. Right hand is FREE to operate blade. 26" handles.

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Most powerful compound lever Tree Trimmer made. Will easily sever branches up to 1¼" diam. Pulley and compound lever give 9 to 1 cutting power. Head complete weighs only 1¾ lbs. 4 to 16 ft. lengths. Other types.

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For pruning larger limbs than our No. 1 Tree Trimmer. No. 43 has 12 in. drag tooth blade. No. 44 has 16 in. peg tooth blade with 7 teeth per inch. Saw is adjustable. Light weight.

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For destroying and preventing the growth of wood destroying fungi and for the protection of wounds, use Bartlett's Tree Paint. Easily applied with ordinary paint brush.

Used by U. S. Government State Highway Departments and Tree Experts

Send for Catalog No. 24

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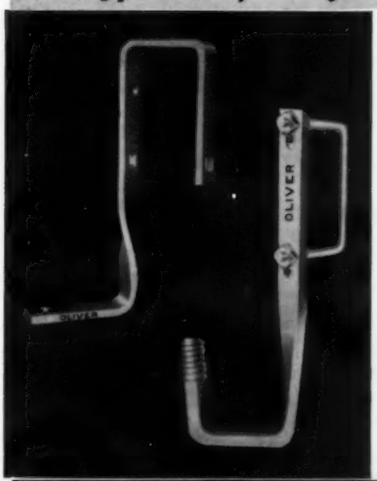
POLE LINE MATERIAL

A good specification - always!



HOT GALVANIZED OLIVER STANDARD TRANSPOSITION BRACKETS

are made in four styles and meet the individual standards of the Western Union and American Telephone and Telegraph Co., The American Telephone and Telegraph type bracket is provided with a ⅝-inch round hole for lagging to the arm to prevent side movement.

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TELEPHONE MAN available—20 years switchboard installation and maintenance. Expert on circuit. Have engineering and supervisory experience. References. Answer David Alexanderson, 42 Glor Street, Buffalo, New York.

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A New Telephone Repeater

Self-adjusting to changing impedance. No balancing nets. Adapted to Line, Terminal and Cord-circuit uses. Accurate balance; high gain.

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Telephone Bldg. Kansas City, Mo.
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135 S. Second St. Philadelphia, Pa.

ates in its own compartment and is attached to its individual panel, the panels being on opposite sides of the standard. Cable ends are attached to numbered connecting posts, and the duplicate numbers of the two panels are connected by "jumper" wires. This permits provision for individual or party lines by the attachment or removal of the jumper wires. Office rack numbers of lines and terminal numbers correspond, so that in case of cable trouble, the repair man may instantly locate the corresponding number at the terminal, make tests, and discover the difficulty. Thus is eliminated the necessity for removing sleeves or opening splices before trouble tests can be made.

Klein Introduces New Product

Mathias Klein & Sons have just announced their new Red Center "Klein-Kord."

"Klein-Kord" Red Center Fabric is made of six plies of long staple cotton of special weave, each ply laid in rubber and vulcanized. Red rubber is used on the two center plies. The "Klein-Kord" Red Center Safety Strap may be used with perfect safety until two outside plies are worn completely through. When that occurs, the Red Center warns the lineman or safety engineer that the safety strap should be discarded.

Manufacturers Assist Conventions

Assisting the various state conventions by issuing publicity urging attendance has been one of the features of the Chicago office of Stromberg-Carlson Manufacturing Company. Illustrated letters are sent to all members of the various associations just prior to their state meeting, and according to Mr. H. P. McCaig, manager of the Chicago division of Stromberg-Carlson, much good will for the company and attendance for the convention has resulted.

New Telephone Booth At Ohio Convention

Of much interest to all attendants of the recent Ohio convention was the exhibit of a new all-steel folding door telephone booth. A product of the Sherron Metalic Corporation, the colorful booths in contrasting color shades are already

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Carney

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Telephone Engineering — Construction Supervision — Appraisals — Financial — Rate Investigations

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READY PAY-OUT REELS

Made in 12 different models. If your jobber does not have them, write us at once for quotations.

A READY JR. handling wire coils with inside diameter down to 6 inches will be ready soon.

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For the convenience of readers of Telephone Engineer

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Kellogg cordless

Kellogg floor type

S. C. Co. floor type

W. E. Co. floor type

◆

Buckeye Telephone & Supply Company
COLUMBUS, OHIO

RECONSTRUCTED EQUIPMENT

Western Elec. No. 505C Cordless P. B. X. board with 7 Local Visual Signal lines and 3 ring down trunks equipped. Complete with desk set Opr. set @	$85.00
Kellogg No. 115 desk type Grabaphone hand sets complete with 3 Conductor cord less signal set @	4.75
Western Elec. No. 51CN desk stand with W. E. Trans. & Auto Rec. complete with dial less signal set @	7.25
Kellogg No. 2696 type 5-bar 1600 ohm Bdg. compact type wall telephones	9.00
Stromberg Carlson No. 896 Pony type 3-bar 1000 or 1600 ohm compacts	8.75
Kellogg No. 11 or 12 Grabaphone hand set for use with wall type signal set complete with 4 Cond. cord @	3.75
L. M. Ericsson Slip type Receivers with repolished Shell & New cord	.75
Leich, Monarch or Stromberg Carlson Local or Central Batt Transmitters complete with mouthpieces @	.90
Western Elec. No. 22C Shutter type line drops and jacks, per strip of 5 @	8.75
Kellogg No. 301E 500 ohm drops and jacks 10 per strip @	16.00
Monarch 5-bar 1600 ohm Bdg. compact type wall telephones @	8.25

Write for Bulletin

REBUILT ELECTRIC EQUIPMENT CO.
1934 West 21st St., Pilsen Sta.
Chicago, Ill.

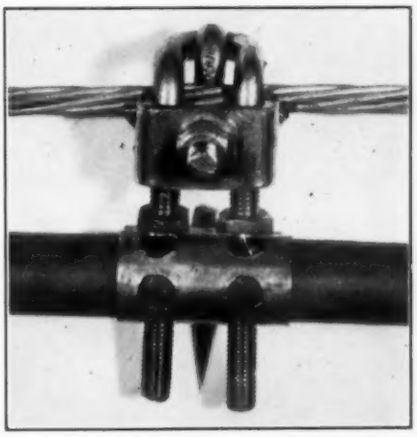
proving their worth all over the United States, according to Mr. A. O. Thomas, of J. H. Bunnell & Co., sales agent for the manufacturers.

Roy G. Siemund, vice-president and general manager of the Leich Sales Corporation, was very enthusiastic over the reception of this newly developed booth and exhibited them in cooperation with Mr. Thomass of the Bunnell company. One color combination of brown and cream proved very striking, however the two tone grays and greens received the votes of the more conservative.

Grade Clamps

The James R. Kearney Corporation, St. Louis, offers three sizes of grade clamps for obtaining and permanently securing the same clearance, between messenger strand and cable, that has been established with the cable rings being used.

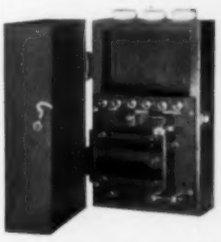
Each size grade clamp has a wide range of clearance, the cable bands accommodating maximum cable sizes of 100, 400 and 900 pair, 22 gauge respectively.



Kearney grade clamps are of simple design. When the two interlocking bolts are tightened, they grip the messenger strand at its smallest diameter, under tension, assuring a permanent non-slipping grip. All parts are tinned or galvanized for long life.

Office Change

General Cable Corporation announces the change in address of their Chicago office from 20 No. Wacker Drive, to 111 No. Canal Street—Telephone connection, Franklin 1101 remains unchanged.



The New **A-C** SUPER-SENSITIVE **J-C**

RECTIFIER TYPE SIGNAL RELAY

• Operating current 200 micro-amp (.0002 amp) at any frequency up to 15,000 cycles — RUGGEDLY BUILT—EASILY ADJUSTED. It solves the telephone signaling problem. Write for descriptive bulletin.

JESTER-COOPER COMPANY
P. O. Box 369 Houston, Texas

SPECIALIST IN
Rebuilding and Repairing
TRANSMITTERS
Grounded Transmitters Made Metallic

Western Electric grounded type of transmitters, black enameled and rebuilt into metallic late style with full floating diaphragm similar to the No. 323 or No. 337 transmitters ..... $ .80

We guarantee to improve the transmitter 3 decibels and lower the battery consumption by 20% on all such transmitters we rebuild. A trial order solicited, with money-back guarantee that the work must be satisfactory or may be returned at our expense.

Metallic type of transmitters, completely rebuilt, each ..... .50

Full information on request.

SPECIAL

W. E. rebuilt common battery handsets with enclosed gong ringer boxes, booster circuit, straight line ringers, for the set $14.50

W. E. rebuilt local battery desk stands with No. 300 type 5 bar 1600 ohm magneto ringer boxes, for the set 12.50

W. E. rebuilt No. 1317 magneto wallphones 5 bar 1600 ohm 12.00

A post card will bring you OUR NEW PRICE BULLETIN containing many real bargains and economies. Write for it.

New No. 14 Galvanized Iron Wire in 1/2 mile coils

per coil 2.75
in lots of 10 coils, per coil 2.50

New No. 17 twisted, paired, braided rubber covered bronze drop wire, in 1000 ft. coils, per coil 10.00

Telephone Repair Co.
Daniel H. McNulty, Manager
Rogers Park Station Chicago

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FOR EXPANSION BOLTS, CONDUITS, ETC.

WODACK "DO-ALL"
This is the electric hammer that can be changed to a drill for metal and wood. Two sizes. Ask for prices.
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THE VINCENT RARE GAS RELAY

On rural party lines cuts out inductive interference, improves transmission; used with either coded or harmonic bells. EASY to install.

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Avoid interruptions to service and provide full protection. Keep your lines clear and reduce maintenance expense. Interchangeable with other types.

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Handiest electrical tester made; quickly locates trouble in electric circuits, fuses, cut-outs, motors, radios, etc. 1,001 uses for electricians. Tests any voltage 110 to 550; tells A.C. from D.C. Fountain-pen size; with pocket clip. Lifetime guarantee.

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NEWARK, N. J. - Estab. 1906
Oldest Makers of Rare Gas Devices

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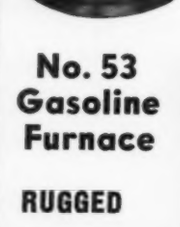

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Index to Advertisements

A

Acorn Insulated Wire Co. —
Aiken Anchor Co. —
Albertson Electric Co. —
Allen Electric Co. —
American Coach & Body Co. —
American Steel & Wire Co. —
American Tel. & Tel. Co. 6-7
Automatic Electric Co. 28-29

B

Bartlett Mfg. Co. 47
Bashlin, W. M., Inc. —
Bell Lumber & Pole Co. —
Berry, L. M. 48
Bethlehem Steel Co. —
Bowdle Accounting System 48
Brach, L. S. Mfg. Co. 50
Brown Wood Preserving Co. —
Buckeye Telephone Supply Co. 49

C

Calculagraph Co. 13
Carney & Co., B. J. 48
Chance Co. A. B. —
Churchill Cabinet Co. —
Coffing Hoist Co. —
Communication Equipment Engineering Co. —
Cook Electric Co. 42

D

Davey Tree Expert Co. —
Dillon Mfg. Co. 45

E

Electric-Storage Battery Co., The 8
Everstick Anchor Co. —

F

Forged Steel Products Co. 43
Four Wheel Drive Auto Co. —

G

Gardiner Metal Co. —
General Motors —
Gould Storage Battery Corp. —
Graybar Electric Co. 35
Grobet File Corp. —

H

Habirshaw Div., Phelps Dodge Copper Products Corp. —
Harding Wm. 48
Herdrich & Boggs —
Holtzer-Cabot Electric Co. —
Hubbard & Co. —

I

Indiana Steel Products Co. —
Lndiana Steel & Wire Co. 43
International Crossarm Co. —

J

Jester-Cooper Co. 49
Johns-Manville —

K

Kearney Corp., Jas. R. —
Kellogg Switchboard & Supply Co. 4-5
Klein, Mathias & Sons 41
Koppers Company —

L

Larkin & Co., John C. —
Leich Sales Corp. 16
Lenz Electric Mfg. Co. 14
Littelfuse Laboratories —
Loomis Advertising Co. 48
Lorain Products Corp. 37

M

McCreary, Harold J. —
Michigan Pole & Tie Co. —

N

National Carbon Co. 2
National Telephone Supply Co. 51
North Electric Mfg. Co. 52

O

Oliver Iron & Steel Corp. 47
Owens-Illinois Glass Co. 14

P

Pensacola Creosote Co. —
Phelps Dodge Copper Prod. Co. —
Phillips Electric Works, Ltd., Eugene F. 35
Potosi Tie & Lumber Co. —
Premax Sales Division 46
Prentice-Hall, Inc. —

R

Ray-O-Vac Co. —
Ready Mfg. Co. 48
Rebuilt Electric Equipment Co. 49
Reliable Electric Co. 38
Russell, C. B. —
Runzel Cord & Wire Co. —

S

Seymour Smith & Sons, Inc. —
Shallcross Mfg. Co. —
R. S. Shely 48
Siemens Bros. & Co., Ltd. 15
Signaphone Corp. —
South Bend Lathe Works —
Stevens Hotel 45
Stromberg-Carlson Tel. Mfg. Co. 9-10-11-12
Sundt Engineering Co. —
Suttle Equipment Co. 44

T

Telkor, Inc. 14
Telephone Repair Co. 49

U

Union Carbide & Carbon Co. 2
Unique Mfg. Co. 50
United Motors Service Inc. —
U. S. Steel Corp. —
Utility Tool & Body Co. —

V

Valentine & Clark Corp. 48

W

Western Electric Co. 33
Whitney Blake Co. 41
Wodack Electric Tool Co. 50
Wood Preserving Corp. —
Wopat, J. W. 48
Wray, J. G. & Co. 48

Y

Yale & Towne Mfg. Co. —